

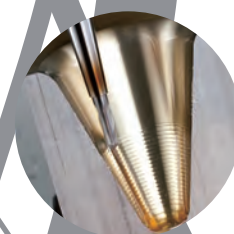
2016 - 2017

DINOX NC TOOLING SYSTEM

DINOX, we process your dream

DINOX NC TOOLING SYSTEM

2016~2017



DX0916-TC-ENG-V1



Head office (15118) 24, MTV 26-ro, Siheung-si, Gyeonggi-do, Korea | T. +82-31-488-6203 F. +82-31-432-0583

Branch Office in China : 21F, Shandong Minyingkeji Building A, Shiling Road 39 Laoshan District, Qingdao City, China
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DINOX, we process your dream



ACQUIRED ISO QUALITY
MANAGEMENT SYSTEM
KS Q ISO 9001 : 2009 / ISO 9001 : 2008



ACQUIRED ISO ENVIRONMENTAL
MANAGEMENT SYSTEM
KS I ISO 14001 : 2009 / ISO 14001 : 2004



BT	59
S(T)	141
HSK	149
SK	163
NT	181
cBN/PCD	185
OTHER	205

**DINOX,
we process your dream**

DINE

Dinox is the one surpassing over technology and quality in global market with customer's trust.

We contribute to the industry of automobiles, electronics, machinery, plant with supplies of good quality item to customer. We try our best to inform primacy of korea's tools with a range of exports.



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HISTORY

- 1975. 07 Established as HAN-JU TRADING CO. (sales of imported cemented carbide cutting tools)
- 1988. 07 Conversion of corporation and transformed to DINE / inauguration of mr. Lim, sangjin as C.O.O
- 1989. 02 Started manufacturing holders & locators and supplying to korloy as OEM
- 1989. 11 Started manufacturing cBN and PCD cutting tools
- 1990. 04 Technically tied up with kyoritsu seiki corp., Japan for manufacturing tooling system for 3years
- 1990. 12 Started manufacturing tool holders on nc tooling system
- 1994. 08 Technically tied up with sumitomo electric ind ltd., Japan for manufacturing cbn cutting tools
- 1995. 12 Moved a factory for tooling system to sihwa ind. Zone
- 1997. 03 Moved a factory for cbn/pcd to sihwa industrial zone
- 1997. 09 Promoting domestic production of unified angular head made by kyoritsu seiki, japan
- 1998. 11 Moved a head office to sihwa ind. Zone 2da-705, 1257-4, jeongwang-dong, siheung-city, kyungki-do
- 1999. 08 Acceded to ilsin inc. And pretos inc. And transformed to dine inc.
- 2000. 02 Nominated as a family company by the industrial bank of korea
- 2000. 08 Selected as issuing company of a loyal commercial paper by the industrial bank of korea
- 2001. 07 Acquired ISO 9001:2000 certificate by SMCC
- 2001. 11 Awarded the "THREE MILLION DOLLARS TOWER" on the 38th trade day by korea international trade association
- 2003. 03 Applied for patent of "MILLING CHUCK" improving clamping accuracy
- 2004. 07 Passed a renewal examination of ISO 9001:2000 certificate
- 2004. 11 Awarded the "FIVE MILLION DOLLARS TOWER" on the 41st trade day by korea international trade association
- 2005. 01 Registered as a family company by korea polytechnic university
- 2006. 01 Set up the 2nd plant in sihwa ind. Zone
- 2006. 04 Selected as a target company of learning organization activities for small and medium enterprises
- 2006. 06 Established branch office in qingdao, china / 高耐大因刀具商貿(青島)有限公司
- 2006. 09 Established industrial R&D center of DINE
- 2006. 10 Authorized establishment of industrial R&D center of DINE by korea industrial technology association
- 2006. 11 Awarded the "TEN MILLION DOLLARS TOWER" on the 43rd trade day
- 2006. 12 Nominated as an innovation business(=inno-biz) company by smba
- 2007. 01 Opened knowledge management system called "DAIAN"
- 2007. 04 "The milling chuck preventing something foreign from going into the interior and having a steady structure" (no. 10-1060687 Given by korean intellectual property office)"
- 2007. 08 Acquired a promising small and medium-sized enterprise certificate for 5 years
- 2007. 10 Established manufacturing corporation in china / 高耐大因工具制造(青島)有限公司

- 2007. 12 Awarded the "presidential award" on the day of machine tool (Mrs. Yun, hyesub / chairman of DINE INC.)
- 2008. 07 Groundbreaking ceremony of manufacturing corporation in china / twice achievement of a goal for zero accident
- 2008. 10 Three times achievement of a goal for no disaster
- 2008. 12 "Awarded the ""TWENTY MILLION DOLLARS TOWER"" on the 45th trade day by korea international trade association / awarded the ""grand prize of exportation"" by GSBC"
- 2009. 12 Contracted MOU with a bonded area in qingdao / building completion ceremony of manufacturing corporation in china
- 2010. 02 Applied for patent of "TOOL HOLDER CLAMPING SYSTEM" (No. 10-2010-0012422)
- 2010. 05 Registered as a family company by gyeonggi college of science and technology
- 2010. 06 Contracted a skill support agreement with human resources development service of korea
- 2010. 09 Selected as the best HRD company
- 2010. 11 "Confirmation of productivity management system(PMs) / awarded "the EXPORT TOWER" by industrial bank of korea / nominated as a management innovation business(=main-biz) company by SMBA"
- 2011. 03 Awarded the "the most glorious trader of this month" (Mrs. Yun, hyesub / chairman of DINE Inc.)
- 2011. 08 "The cutting tool module with a double pitch screw for fine adjustment of machine tools (no. 10-1060687 Given by korean intellectual property office) "
- 2011. 09 Acquired ISO 14001 certificate
- 2011. 11 Zero accident purpose achievement certificate for a head office and for a factory
- 2011. 12 Awarded the "THIRTY MILLION DOLLARS TOWER" on the 41st trade day by korea international trade association
- 2012. 04 Acquired 'green-biz' certificate by SMBA(GRADE A)
- 2012. 05 Selected as the company for 'hidden champion' by the export-import bank of korea
- 2012. 08 Contracted "REHABILITATION SOCIAL CONTRIBUTION" with the city hall of siheung
- Awarded on the 40th commerce and industry day by the ministry of knowledge economy (Mrs. Yun, hyesub/ chairman of DINE Inc.)
- 2013. 03 Awarded on the 12th fair trade day by fair business trade commission (mrs. Yun, hyesub/ chairman of DINE Inc.)
- 2013. 04 Reacquired iso9001
- 2013. 07 Awarded "certification of manpower resource development"
- 2013. 09 Awarded "corporation sponsored siheung 1 % welfare foundation" by the
- 2013. 12 Awarded "corporation sponsored SIHEUNG 1 % welfare foundation" by the mayor of SIHEUNG City Hall
- 2014. 06 Relocation of head office and factory - siheung smatr hub MTV
- 2015. 12 Industrial complex
- 2016. 11 Awarded the "FIFTY MILLION DOLLARS TOWER" on the 53st trade day by Korea international trade association

NEW PRODUCTS

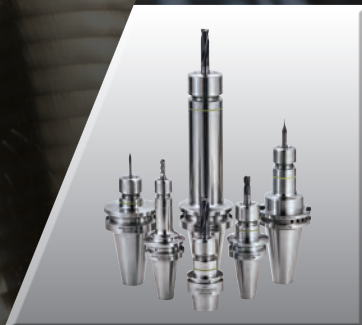
NEW DST

Feature 37page



GSK NEW

Feature 33page



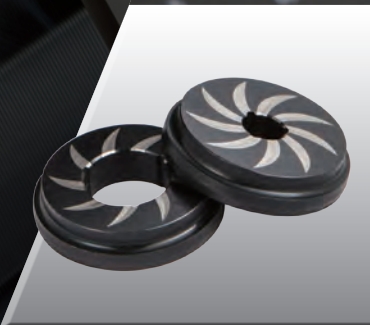
ROT NEW

Feature 57page



RTJW NEW

Feature 30page



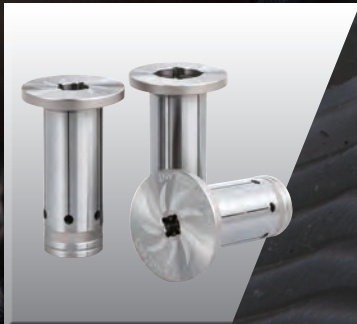
FBH/B NEW

Feature 42page



DCJ NEW

Feature 28page





FOR SAFETY GUIDE IN USE

Please read followings prior to tool using
User also should note the precaution of Each Tooling for safety use.

Please be aware of safety guidance first written below, prior to DINE products using.
For common pre-caution and an individual guidance, please refer to the contents written above.
The following guidance is to handle DINE products in a right way and to prevent operators from an injury. According to a level of risk and seriousness of an injury caused by wrong operation, safety guidance is divided into three steps: Danger, Warning and Pre-caution. Since all guidance include very important information about safety, please surely follow the rules.



DANGER

It means that operators should be seriously injured or should court death caused by abusing tools at in-appropriate condition.



WARNING

It means that operators could be seriously injured or could court death caused by abusing tools at in-appropriate condition.



PRECAUTION

It means that operators might get injured or could get physical damages caused by abusing tools at in-appropriate condition.

Please obey the occupation safety & health acts and other safety regulations.
Note that it might bring more serious results than the fact mentioned on 'Pre-caution' by circumstances. Since all guidance include very important information about safety, please surely follow the rules.

! WARNING

PLEASE CHOOSE CORRECT TOOLING

The Tooling items on the catalogue are applied to various conditions. After working required analysis and inspection, Machine operator and system desinger should check whether the tooling can be used on the current system or not.

Responsibility of estimated performance and Safety for system is belonged to who have decided suitability of Tooling to the current system. From now, please review all specification on the newest catalogue & data when you work the system.

Also, please consider several conditions causing any malfuntion on the machine.

OPERATION BY ONE WHO HAVE EXPERIENCED ENOUGH WITH NECESSARY TECHNICAL KNOWLEDGE

Please read carefully this Catalogue and Manuals before use.
Wrong or improper use might cause wound or property damage. Tooling is designed for Machine and Tool, and Both Machine and Tooling should be operated by an operator with proper maintenanece knowledge.

TOOLING IS DESIGNED FOR MACHINE TOOL. DO NOT USE THESE TOOLING WITH OTHER MACHINES OR DEVICES.



COMMON PRE-CAUTION FOR TOOLING.

Please read followings prior to tool using.
User also should note the precaution of Each Tooling for safety use.

WHEN CHOOSE TOOLING



WARNING

Please check the size of machine spindle and Tooling Shank.
If the size and shape doesn't fit, it leads to incomplete installation, so may cause tool separation, or damage on machine spindle or cutting tool due to vibration coming from Revolution.

Please do choose proper size and shape on Clamping parts of Tooling.

If cutting tool doesn't fit with clamping parts of Tooling, it may cause bound by loosen tool or tool separation.

Please operate with proper cutting condition,.

In case of excessive use much more than tool performance, it causes damage on Cutting tool and Tooling.

WHEN OPERATE THE TOOLING



WARNING

When you convey the tooling or take it out from the case please be careful not to be bounced or felt.

There is a risk of harmful damage.

When you move a few number of packaged Tools or heavy Tooling, please do give proper attention.

(Use a conveying machine or devices if needs)

Please don't convert or disassemble tooling.

Function and performance might be getting worse. If you need to convert or to disassemble it, please discuss the matter with a maker.



PRECAUTION

Please pay attention to that the clamping part should not be scratched, grooved or any cutting powder & rust on the product.

It might be a reason of damage on Cutting tools or irregular Run-out coming from less cylindercity and clamping force.

Please do not touch the thread of screw by your hand.

Not finished Thread of screw and screw is sharp and therefore, it could give damage.

WHEN INSTALL THE CUTTING TOOL



WARNING

Please wear a protection helmet and gloves to install the cutting tool on Tooling.

Sharp cutting blade on a Cutting Tool could be damageable on the user who is not wearing a protection helmet and gloves.

When installing Cutting tool, please do absolute clamping.

Please use clamping spanner supplied by a maker only. Put the spanner on the tooling correctly, then do screwing slowly. It is not recommendable to use a Hammer or other devices for tightening clamping.

WHEN INSTALL THE TOOLING ON A MACHINE



WARNING

Please read a manual prior to use tools.

Please previously read and understand a manual and then do installation and use it. A user should place the manual nearby a machine for case.



PRECAUTION

When do tooling installation, please remove dust, scratches and rust on a Machine Cylinder, Tool Shank and clamping parts.

These could affect the Run-out.

Please check Run-Out or Accuracy regularly.

Check Run-Out of Machine Cylinder and Tool clamping parts with a Test bar.

Pull-Stud is a kind of consumptive parts and the user should replace it regularly.

Fatigue-Broken could cause damages on a Machine, Cutting Tool and Tooling. (Fatigue-Broken may occur after 5 months)

WHEN IT IS IN OPERATION



WARNING

Do not touch while operating of Tooling.

If users touch the Tooling or tools during operation, they will get injury or their clothing would be sucked into the machine.

Do not operate the machine without Cutting tool on Tooling.

Idle R.P.M. could make the scattering of nuts and screws by looseness. If Idle R.P.M. needs, firstly check each part and then install non scattering devices or a Test bar.

Be careful not to be counterturn.

If counterturn, there could be a risk of cutting tool damaged or parts scattering.

Please wear Protection kit (a Helmet, a Goggle and gloves) during operation.

There would be risks that burn or stab caused by cutting powders or chips with high-temperature.

When installing the high-pressure coolant devices, never place your hands or a body at the end of Cutting tools.

Cutting tools could be scattered by wrong operation

FOR SAFETY GUIDE IN USE



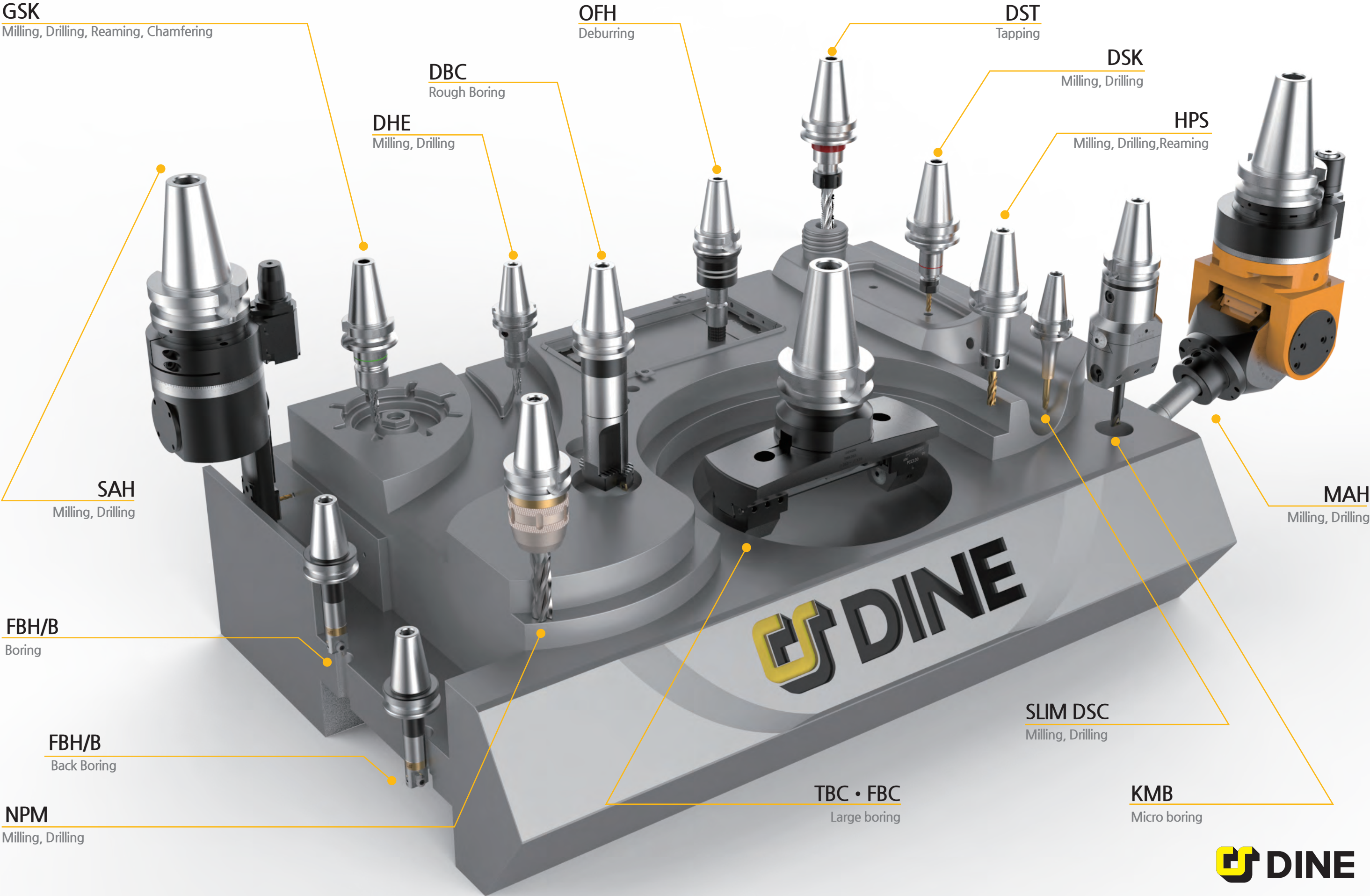
WARNING

Please put the products in the place which you can keep them without scratches after you clean off cutting powders and chips of tooling and rub with rust-preventing oil.

Please keep the cutting tool separately in case you want to keep the tool holder for a long time.

"The product's clamping force will be reduced in case you keep the product installed with the cutting tool. If the product installed with the cutting tool have been stored for a long time, please do clamping and unclamping before you use it."

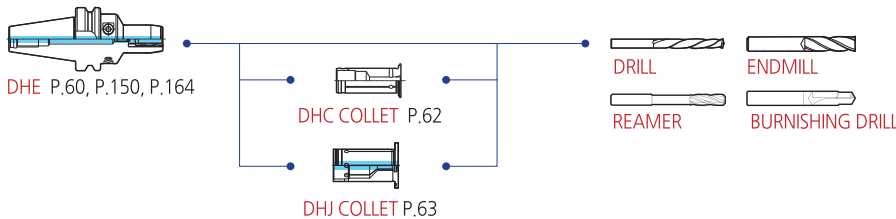
DINOX TOOL APPLICATION



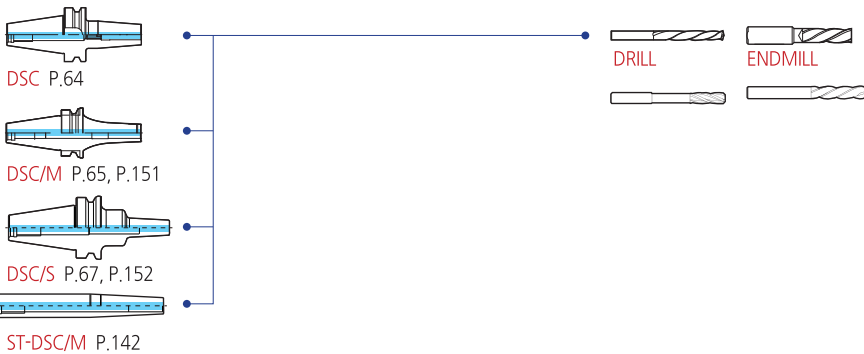
DINOX MAP

NC TOOLING SYSTEM

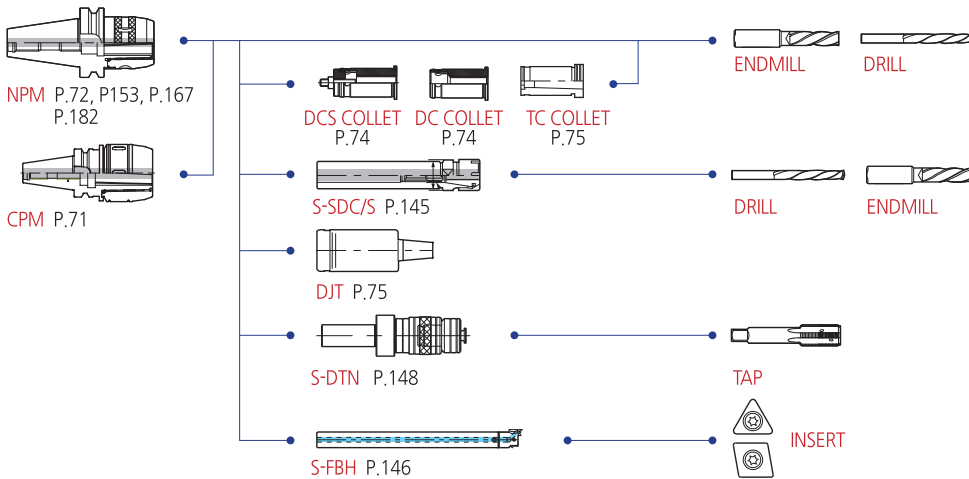
1. Hydraulic expansion chuck



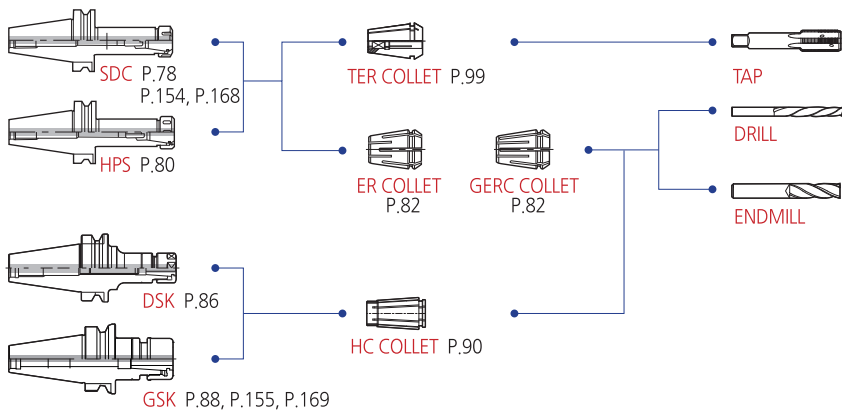
2. Shrinking chuck



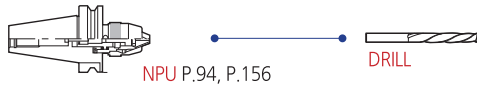
3. Milling chuck



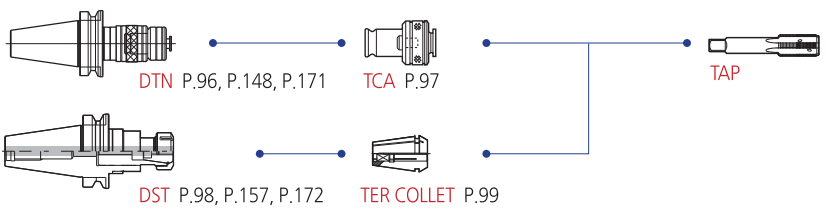
4. Collet chuck



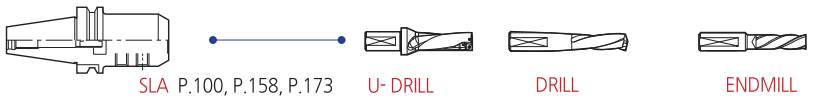
5. Drill chuck



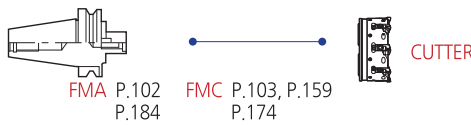
6. Tapping holder



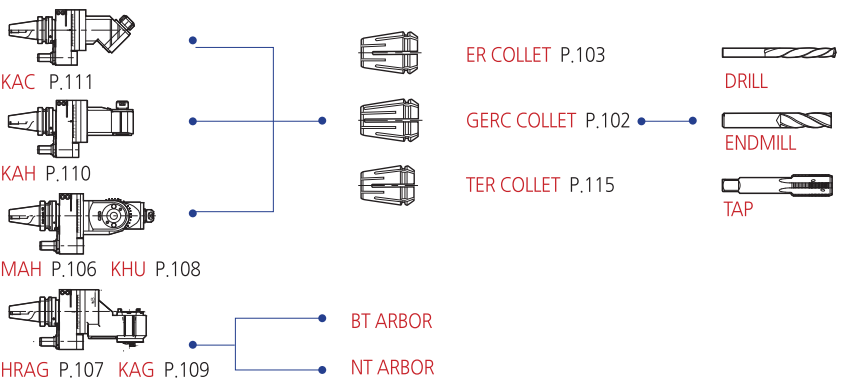
7. Side lock arbor



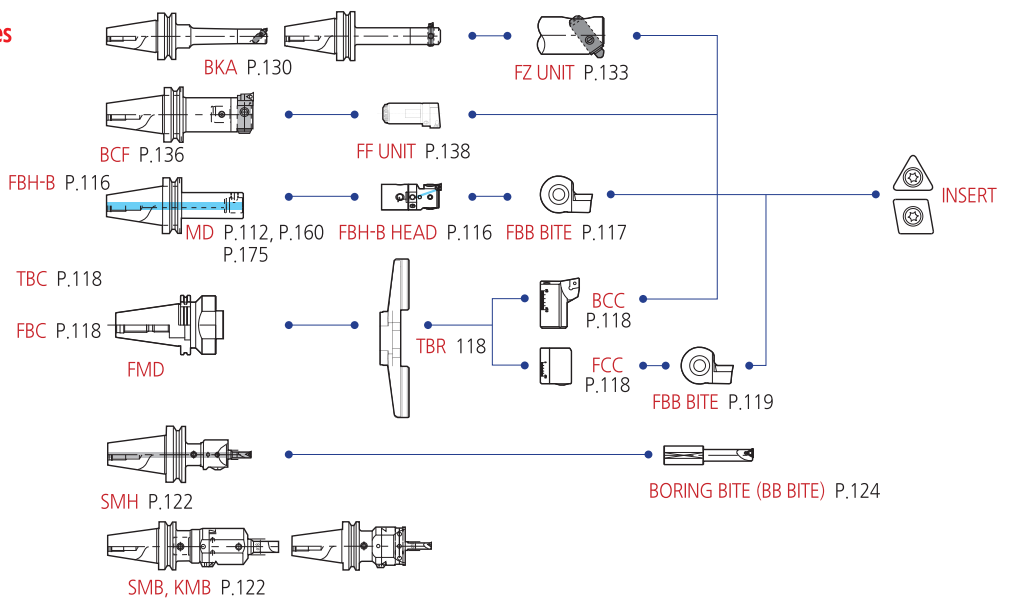
8. Face mill arbor



9. Angular head



10. Boring series



11. Pull stud bolt



MASTER INDEX

 This symbol means built-in through coolant system
 This symbol means optional through coolant system
 This symbol means unavailable with through coolant system

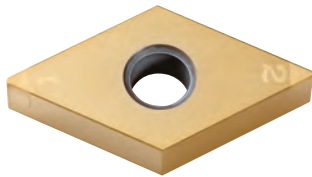
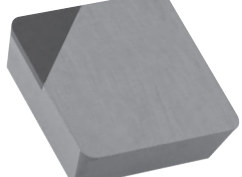
CHUCK		
		
DHE Hydraulic expansion chuck BT shank 60 HSK shank 150 SK shank 164 Features 29	DSC Shrinking chuck BT shank 64 ST shank 142 HSK shank 151 SK shank 165 Features 24	CPM Champion milling chuck BT shank 71 Features 27
CHUCK		
		
NPM New power milling chuck BT shank 72 HSK shank 153 SK shank 167 NT shank 182 Features 26	SDC ER Collet chuck BT shank 78 S shank 144 HSK shank 154 SK shank 168 Features 31	HPS High speed ER collet chuck BT shank 80 Features 31
CHUCK		
		
DSK Slim type collet chuck BT shank 86 Features 34	GSK Great speed slim collet chuck BT shank 88 HSK shank 155 SK shank 169 Features 33	NPU Drill chuck BT shank 94 HSK shank 156 SK shank 170
CHUCK		
		
DTN Tapping holder BT shank 96 S shank 148 SK shank 171 Features 36	DST High speed synchro tapping chuck BT shank 98 HSK shank 157 SK shank 172 Features 37	OFH Floating holder for brush Features 35

CHUCK		
		
SLA Side lock arbor BT shank 100 HSK shank 158 SK shank 173	FMA Face mill arbor BT shank 102 NT shank 184	FMC Face mill arbor BT shank 103 HSK shank 159 SK shank 174
ANGULAR HEAD		
		
SAH Slim angular head Features 39	MAH Reinforced type angular head (0°-90°) BT shank 106 Features 40	HRAG Reinforced type angular head (90° fixed) BT shank 107 Features 41
ANGULAR HEAD		
		
KHU Collet type angular head (0°-90°) BT shank 108 Features 40	KAG Angular head (90° fixed) BT shank 109 Features 41	KAH Collet type angular head (90° fixed) BT shank 110 Features 40
ANGULAR HEAD		MODULAR
		
KAC Collet type angular head (45° fixed) BT shank 111 Features 41	MD Modular arbor BT shank 112 HSK shank 160 SK shank 175	EXT Extension bar Spec 114

MASTER INDEX

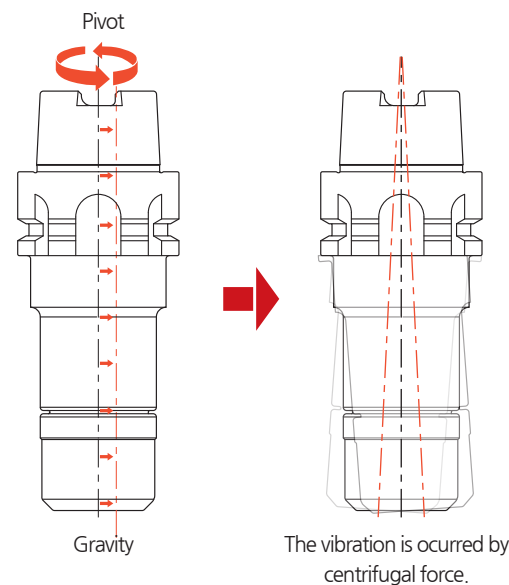
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 This symbol means optional through coolant system
 This symbol means unavailable with through coolant system

MODULAR		BORING		
				
RDC Reducer bar		FBH/B Micro boring bar (balanced type)		FBH Small micro boring bar (balanced type)
Spec 114		BT shank 116 SK shank 177	S shank 146 Features 42	S shank 147
BORING				
				
FBC/TBC Balance cut tool for rough boring		DBC Balance cut tool (Modular type)		KMB Micro boring
BT shank 118 Features 43		BT shank 120 SK shank 179	HSK shank 161	BT shank 122 SK shank 180 HSK shank 162 Features 45
BORING				
				
SMB Small micro boring bar		SMH Small micro boring bar (High accuracy type)		BSA Square boring bar
BT shank 122 SK shank 180		BT shank 122 SK shank 180	HSK shank 162 Features 45	BT shank 126
BORING				
				
BH Square boring Bite for BSA		BKA FZ micro boring bar (Finishing)		FZ UNIT FZ micro boring Unit
Spec 129		BT shank 130		Spec 133

BORING				
				
BCF Micro boring bar		FF FF Unit		PULL STUD BOLT Pull stud bolt
BT shank 136		Spec 138	Spec 140	
cBN/PCD				OTHER
				
cBN cBN Insert (Negative/Positive)		PCD PCD Insert (Negative/Positive)		DH2000 DINE high frequency induction heating device
Spec 190 Features 46		Spec 202	Features 25	
OTHER				
				
ROT Run-out tester		NEW 3D-Taster		TOOL MASTER Quadra Tool presetter
Spec 57		Spec 58	Spec 206	
OTHER				
				
TOOL MASTER BASIC Tool presetter		HT-100, DZH, DZP Height gage		PART
Spec 207		Spec 208	Spec 216	

BALANCING SYSTEM

Balancing



The cause of unbalancing

The occurrence of unbalancing from run-out is caused by spindle and assymetry of tool's shape.

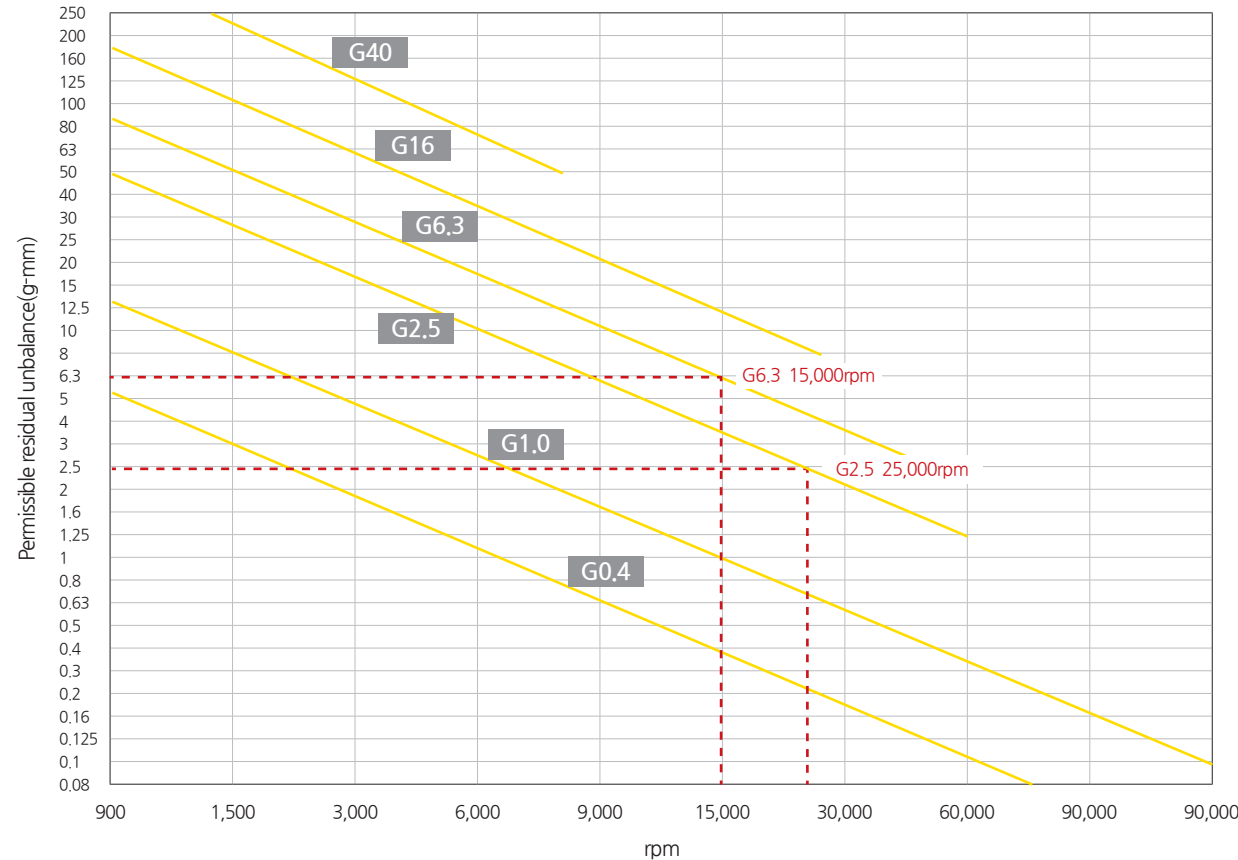
The problem of unbalancing

The vibration in the tool by centrifugal force leads to noise and deterioration of surface roughness and tool life.

The necessity of balancing work

Balancing work is necessary for better surface roughness, accuracy and tool life.

※ The phenomenon is that the center of gravity in tool keeps off from a pivot

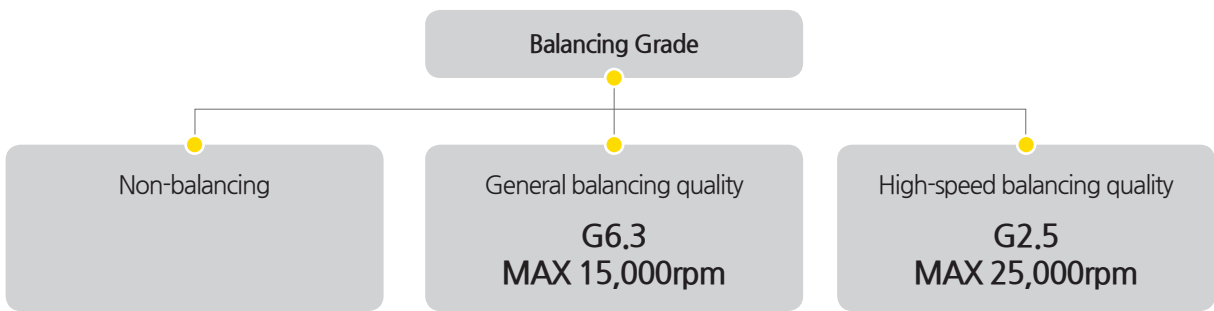


BALANCING SYSTEM

The most optimal accuracy at high speed.

1. Keep high accuracy and rigidity without bending of rotating product due to unbalanced load
2. Excellent balance ($\leq G2.5$ or 0.5 g-mm/kg)
3. Improve tool life, surface finish, dimension of accuracy and productivity at high speed

Balance control



The possibility of multiple balancing's quality



BT, HSK, SK Shank

Balancing type with hole

DBT Series PAT.

2 face constrained BT type spindle system

HSK TOOLING SYSTEM

DIN69893-1, ISO 12164-1 : 201

DBT spindle system

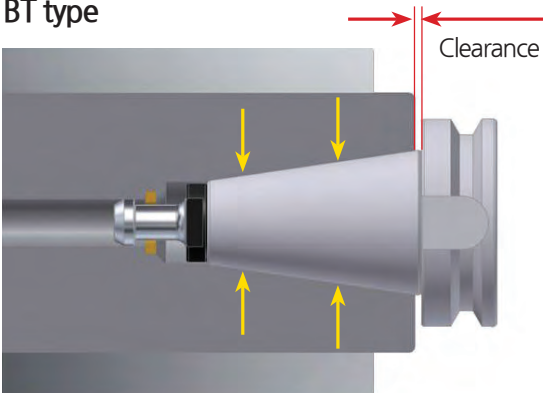
2 Face contact type (taper and flange face)
for high speed, roughing, finishing and surface roughness

The advantage of 2 sides contact type

- Stable machining under high speed.
- Improvement of tool-life for machine spindle and cutting tool.
- Corrosion prevention in the taper
- Vibration prevention of spindle
- High accuracy

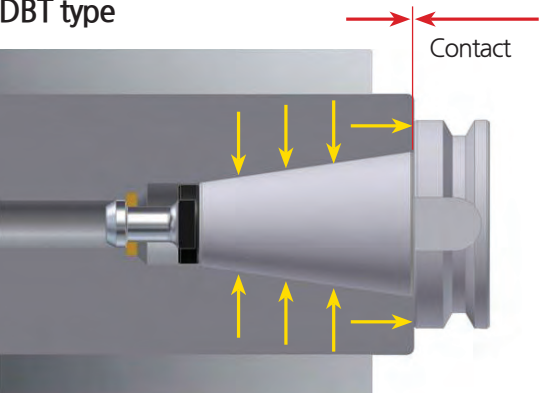


BT type



The clearance between spindle and flange face

DBT type

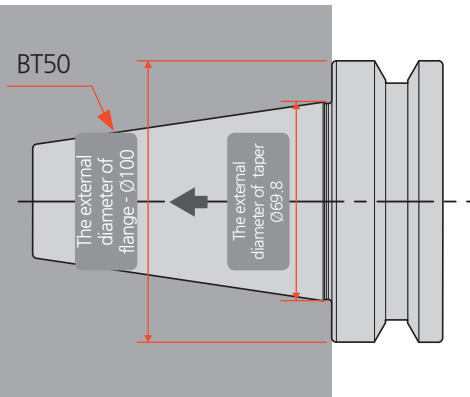


Perfect contact of both faces : better clamping

Powerful clamping

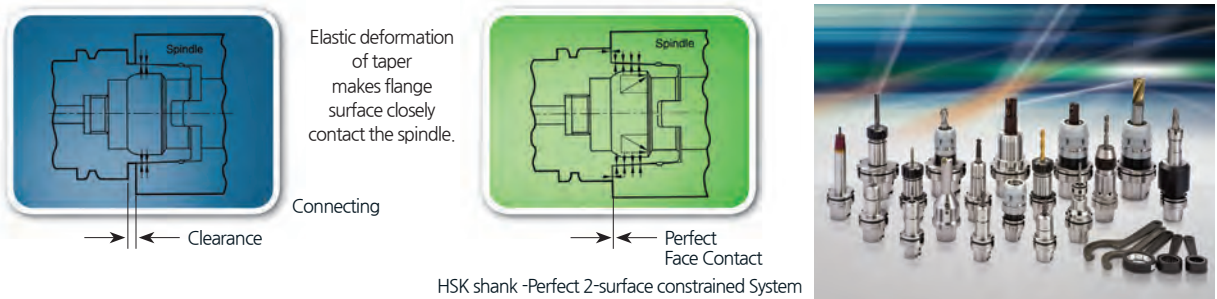
Unlike BT, DBT shank has better clamping force because of contact both the taper and flange - faces

Shank	External diameter of taper	External diameter of flange
BT30	Ø31.7 → Ø46	
BT40	Ø44.4 → Ø63	
BT50	Ø69.8 → Ø100	



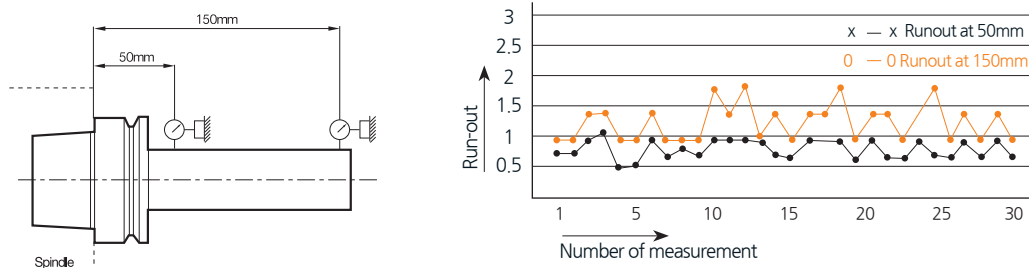
HSK : 2 Face Constrained Tool holder

The 7/24 taper shank for multi-purpose has been pointed out that its performance is inappropriate in terms of repeatability, joint stiffness and high speed machining. Drawbacks of 7/24 taper shank had been eliminated by using new two face contact.

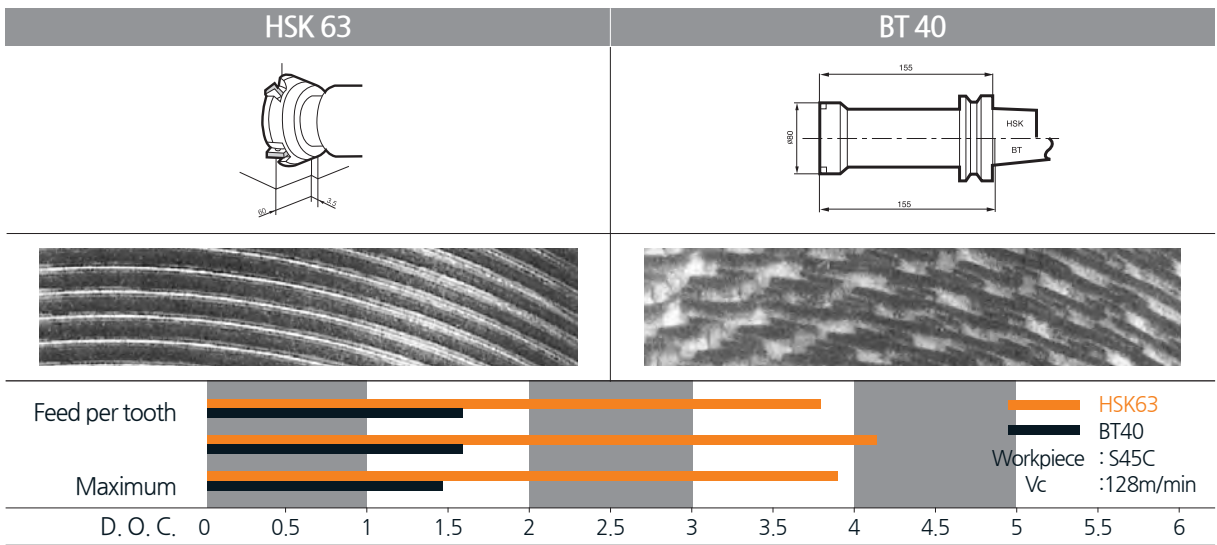


Runout

As taper of holder elastically deform following the profile of the spindle shape, there is no eccentricity between the spindle and holder. Also, due to perfect face contacts between flange of the holder and spindle face, bending strength of the holder becomes very high, It decides run out accuracy



Comparison (HSK63 VS BT40)



DSC NEW
Shrinking chuck



Feature

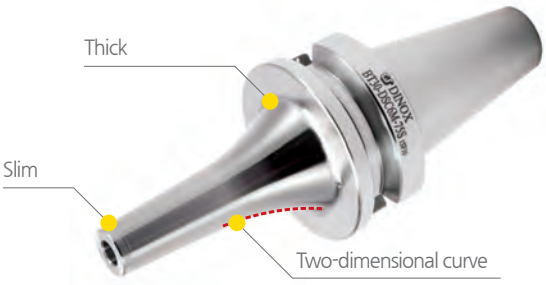
- Run out = 3µm
- Special heat treatment : prolonged tool life
- Excellent machining & assembling with high accuracy
- Minimized tool extension in the deep part : long tool life
- Tool dia : Ø3~32

Nominal designation

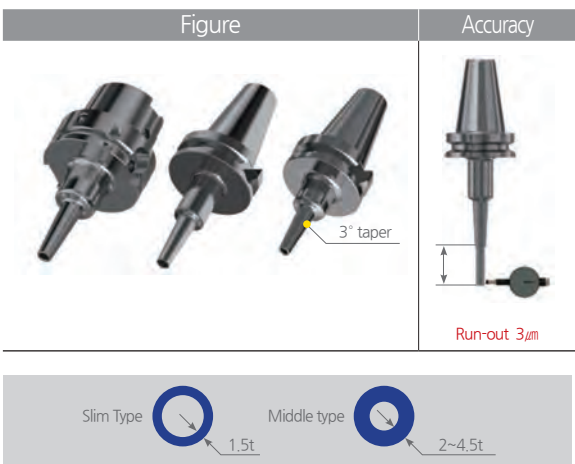
BT50	DSC	6	S	165	S
Shank shape BT HSK SK ST CS CM	Holder type DSC : Shrinking chuck SLK : 2piece holder Collet	Tool dia.	Type S : Slim M : Middle NONE : General	Length	Special S : Curve type NONE : General

Mono curve type NEW

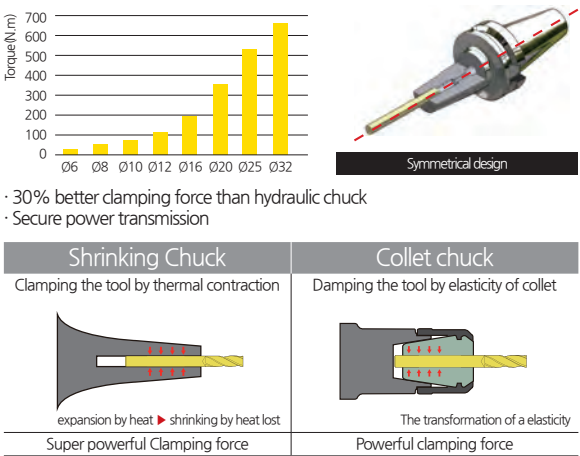
- Great accuracy and rigidity
- Long but rigid design of holder



Mono type



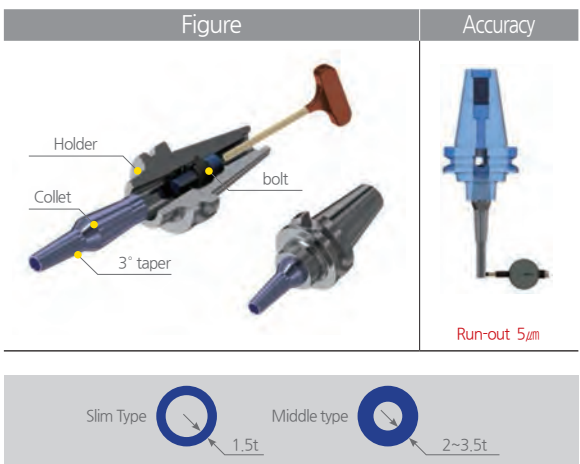
Clamping force



- 30% better clamping force than hydraulic chuck
- Secure power transmission

Shrinking Chuck	Collet chuck
Clamping the tool by thermal contraction	Damping the tool by elasticity of collet
expansion by heat ▶ shrinking by heat lost Super powerful Clamping force	The transformation of a elasticity Powerful clamping force

2-piece type

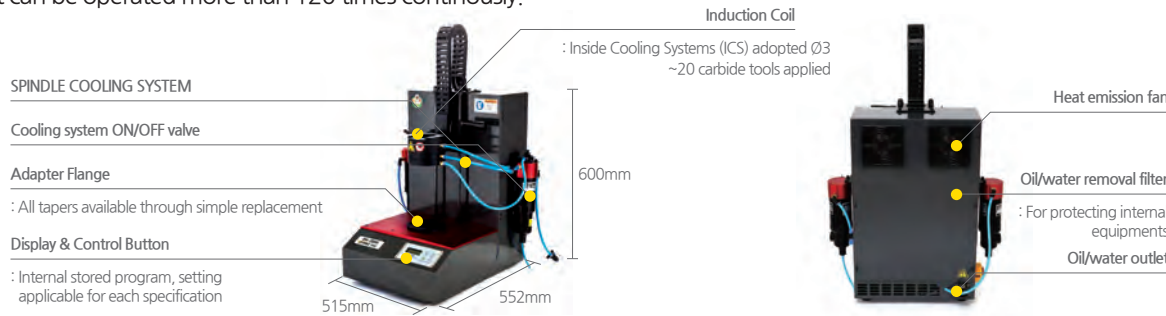


DH2000 NEW
Dine high frequency induction heating device



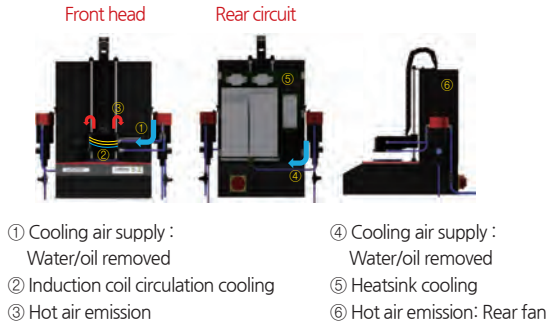
Feature

- Shrinking device for mass-production line
- It can be operated more than 120 times continuously.



Model Name	Size W x D x H (mm)	Weight	Operation range of head	Available dia' of tool	Power supply	POWER
DH-2000	515x552x600	45kg	330mm	Ø3-Ø32(HM)	3-AC380V 50~60Hz+3P+PE	10KW

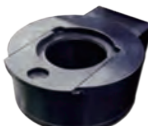
Improvements



Comparison with competitor

	Competitor	Former product	DH-2000
Voltage	-	220V	380V
Tightening time - Based on Ø6	6 ~ 15 sec.	15 sec.	6 sec.
Continuous use	About 30 cycles (Continuous heating impossible)	System down in 30 cycles (Continuous heating impossible)	Continuous heating over 120 cycles (based on external temperature of 20℃)
Extra functions	-	-	- Inside / head cooling - Temperature sensors for protecting oil/ water filtering system(2EA)

Detailed Specifications

Stop Ring		Name	Designation	Spec	Remark
		Stop ring	SR6	Ø3-6	Included
		Stop ring	SR12	Ø7-12	Included
		Stop ring	SR20	Ø14-20	Included
Induction Coil		Stop ring	SR32	Ø25-32	Included
		Induction coil ISO 20	STH32	Ø3-32	Optional
		Induction coil ISO 20	STH20	Ø3-20	Included
		ISO 20	AFB20	Shank 20	Optional
Adapter Flange		ISO 30	AFB30	Shank 30	Optional
		ISO 40	AFB40	Shank 40	Optional
		ISO 50	AFB50	Shank 50	Included
		HSK	AFH63 (HSK63)	HSK63	Optional

C This symbol means built-in through coolant system ● BT : 64P S : 142P HSK : 151P SK : 165P

NPM

New power milling chuck



Feature

- Clamping force : 350kgf·m(NPM32), 500kgf·m(NPM42)
- Protecting the inside from dust by dust block system
- 2 ways of coolant way : Jet / through coolant
- Run out = 15μm(L/D=3)
- Tool dia : Ø6~42

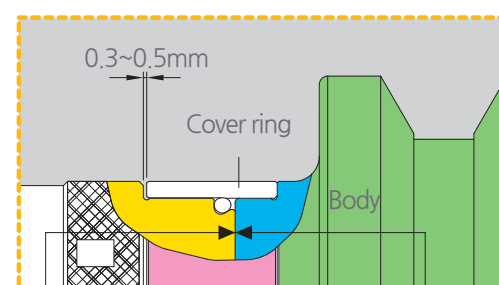
Nominal designation

BT40	-	NPM	32	-	110
Spindle		New power milling chuck	Max. chucking dia.		Length



Durability improvement by prevention of minute dust, chips and coolant.

PAT.

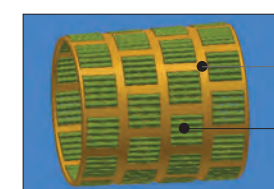


Contacts to cross sections of nuts and the body perfectly.

Adopted stop ring on head parts
- Preventing from minute dust by shim & o-ring.



Needle roller bearing
<NPM20>



- Specially designed steel bearing for damage prevention
- Strong clamping by spreading the force

Stable machining from heavy to fine milling

Perfect face contact and powerful clamping force strengthen both cutting force and absorption of vibration.



Depth of cut
(Rd)=1.0mm



Depth of cut
(Rd)=2.5mm



Depth of cut
(Rd)=3.5mm



Depth of cut
(Rd)=5.0mm



Depth of cut
(Rd)=8.0mm

☐ This symbol means optional through coolant system

● BT : 72P NT : 182P HSK : 153P SK : 167P

CPM

Champion milling chuck



Feature

- The prevention of grease leakage and mixing with foreign substance by o-ring.
- Available through coolant system with CTC set
- Tool length is controllable by insertion of adjustment screw.
- Stable cutting with perfect face contact
- Tool dia : Ø6~32

Nominal designation

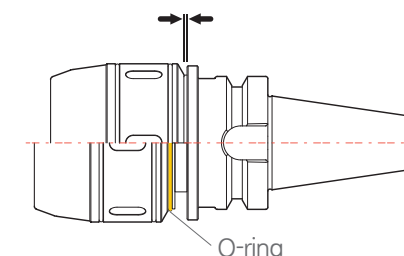
BT40	-	CPM	32	-	105
Spindle		Champion milling chuck	Max. chucking dia.		Length



Prevention of oil leakage and dust

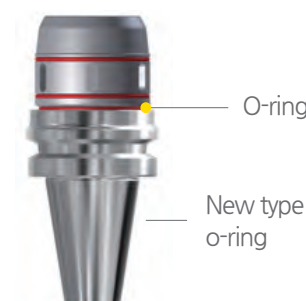
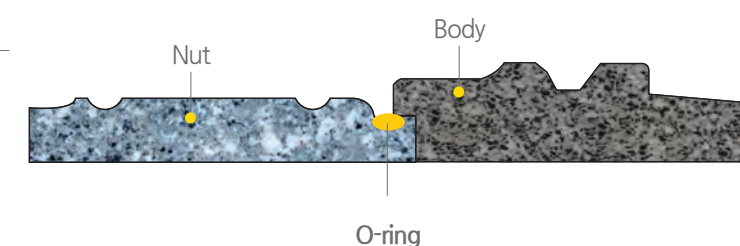
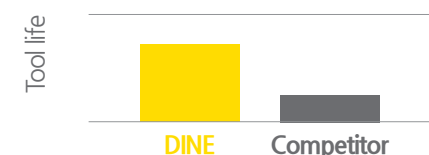
CPM is durable and stable by attaching o-ring on the nut which can absorb the vibration of cutting, so that it can improve the life of tool by the prevention of mixing with foreign substance inside of CPM.

Stable cutting and the prevention of mixing with foreign substance by cross section contact

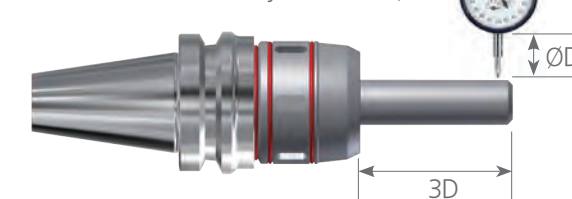


Blocking lubricant leaking and dust

Prolonged tool life by anti-dust system



L/D = 3 runout accuracy = under 15μm



☐ This symbol means optional through coolant system

● BT : 71P

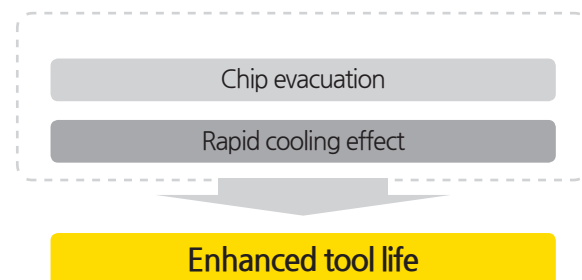


Feature

- Prevent chips sticking on the tool and enhance tool life
- Improvement of chip evacuation by strong jet spray.
- Quick change over to through coolant or jet coolant type by changing collet

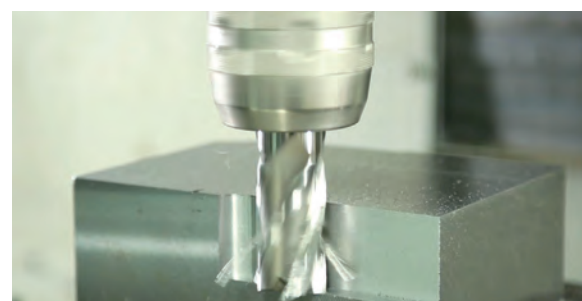


NPM+Jet coolant collet



Coolant type

- Jet coolant
- Through coolant



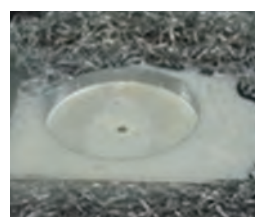
Chip evacuation performance

- Outside coolant



Piled chips in pocket

- JET coolant



Removed chip from the pocket



Feature

- Suitable for mold / automobile / fine milling with high accuracy
- Better surface roughness by reducing vibration
- Convenience
 - Easy clamping by T-wrench
 - Minimize fatigue of operator
 - Short lead time
- Tool dai : Ø3~32

Nominal designation

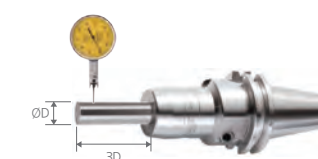
BT40	-	DHE	20	-	140
Spindle		Hydraulic expansion chuck	Max. chucking dia.		Length



Feature

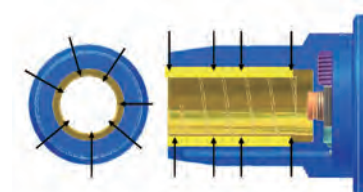
High accuracy provides long tool life because of wear reduced and hydraulic chamber enhances surface roughness by lessening vibrations.

- Run out : under 5μm
- L/D=3
- Shank tolerance : h6



Sealing structure(Durability)

- Internal sealing system protects the chuck from dust, cutting oil, and chips going inside



Shank	Grade	Max.rpm
BT50, SK50, HSK100A	G6.3	8,000
BT40, SK40, HSK63A	G6.3	10,000
BT30, HSK50A, SK30	G6.3	15,000
HSK40A	-	15,000

Easy clamping

- Clamping structure for easy operation



Stable clamping

Fixing a tool by hydraulic force



This symbol means built-in through coolant system

This symbol means optional through coolant system (HSK Shank)

● BT : 60P HSK : 150P SK : 164P

RTJW

NEW

Jet coolant disk



Feature

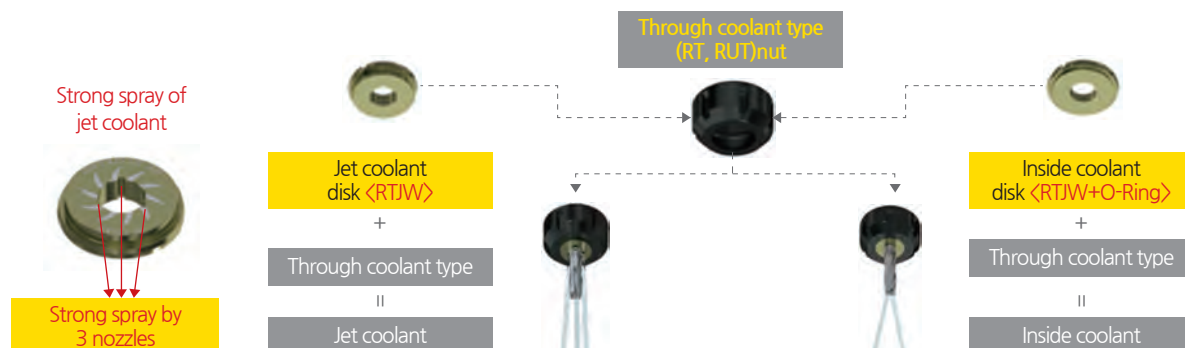
- Prevent chips sticking on the tool and enhance cutting tool life
- Improvement of chip evacuation by strong JET spray

Application

- Multi-coolant way for ER collet chuck
- Easy changing coolant way by replacing o-ring
- Powerful jet coolant without scattering under high speed condition

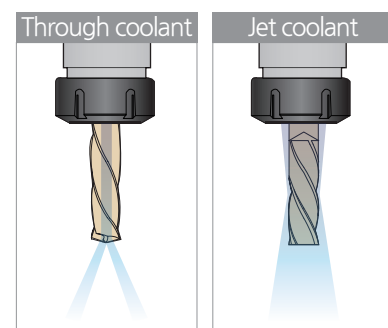


Application



Comparison

	Pocket machining	After machining	Remark
JET COOLANT			▶ Perfect chip evacuation
OUTSIDE COOLANT			▶ Left chips on the pocket



Coolant system

- 2 coolant way
- Through coolant
 - Jet coolant

● SPEC : 77P ➡

HPS

High speed collet chuck



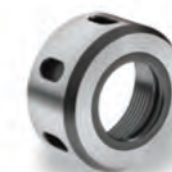
Feature

- Balance : G6.3/ Max 15,000RPM
- Suitable for high speed machining with applying excellent sleeve nut and balancing work
- Tool dia : Ø0.5~20

Nominal designation

BT40	-	HPS	10	-	90
Spindle		High speed collet chuck	Max, chucking dia.		Length

Variety nuts



HPS
(Standard type)

● BT : 80P ➡



SDC

Collet chuck



Feature

- Standard ER collet chuck
- Tool dia : Ø0.5~26

Nominal designation

BT40	-	SDC	10	-	135
Spindle		Collet chuck	Max, chucking dia.		Length



Easy clamping



Special hardening



SDC
(Low speed type)

● BT : 78P ➡ HSK : 154P ➡ SK : 168P ➡
ST : 144P ➡

GERC NEW

GERC collet_ER coated collet



Feature

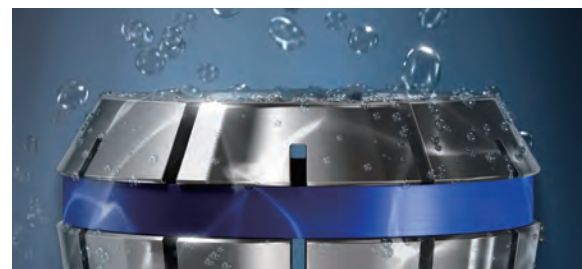
- The prevention of corrosion in micro size
- Latest coating technology provides high accuracy and quality
- Maintaining high accuracy and best quality with coating technology
- Prolonged tool life

Nominal designation

GERC	16	6.0	HP
GER Coating collet	Collet size	Clamping range	HP: Precision NONE: General

Special coating technology

Unlike GERC collet as below conventional collet has feature. Uncoated collet is easily corroded by many factors (moisture, cutting oil, washer, salt, gas). It can be influenced to not only collet quality but also entire cutting.



If collet became rusty, tool life and accuracy are getting worse. Surface coating in micro unit size provides reliable collet quality for a long time.



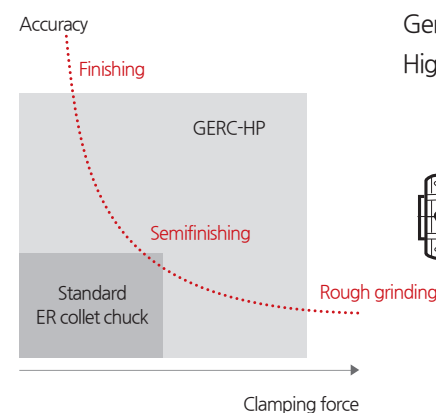
After 4 months
Uncoated collet (Left), coated collet (Right)

GERC-HP (Accuracy type)

Precision collet is a little bit more expensive than standard type, but it is more efficient in the long term. Tolerance with maximum accuracy makes better quality and minimize cost to rework.

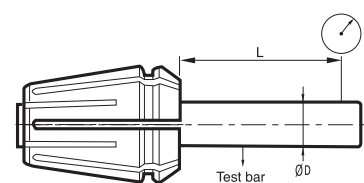


Precision collet
2µm



High accuracy (L/D=3)

General type = 5µm
High accuracy type = 2µm



● SPEC : 82P ➡

GSK NEW

Great speed slim collet chuck



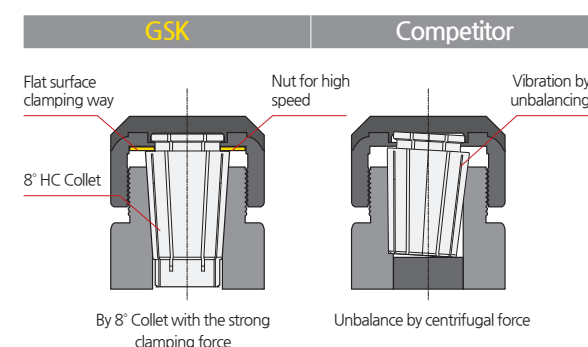
Feature

- Balance : G2.5/ Max 25,000RPM
- Better productivity at high speed machining
- Minimum vibration by 8° collet
- Tool dia : Ø1.8~25

Nominal designation

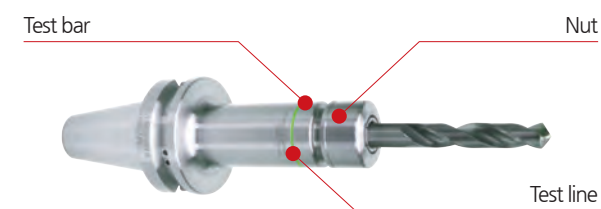
BT40	GSK	10	90
Spindle	Great speed slim collet chuck	Max shucking dia.	Length

Exclusive design



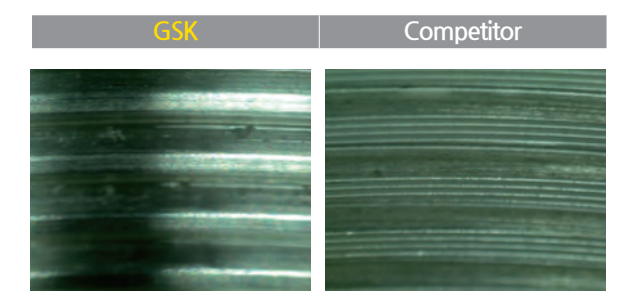
Special design

GSK can be used as test bar by high quality grinding



C This symbol means optional through coolant system

Comparison of grinding quality on nut threaded



Spanner (optional)

Spanner	
Designation	Chuck
GSK6 SPANNER	GSK6
GSK10 SPANNER	GSK10
GSK13 SPANNER	GSK13
GSK16 SPANNER	GSK16
GSK20 SPANNER	GSK20
GSK25 SPANNER	GSK25

● BT : 88P ➡ HSK : 155P ➡ SK : 169P ➡

DSK

Slim type collet chuck



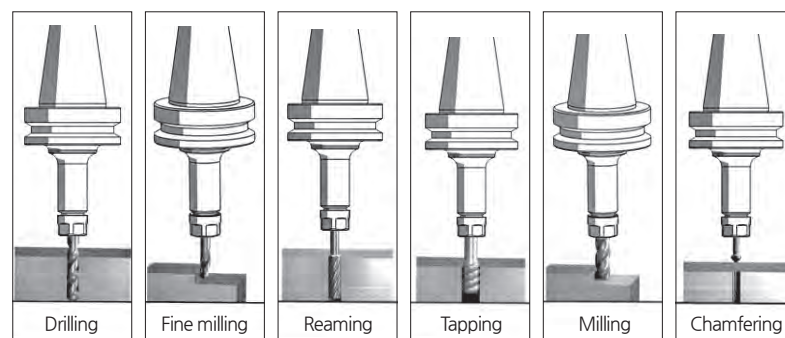
Feature

- Balance : G6.3/ Max 15,000RPM
- Ensure excellent high accuracy with strong clamping force with collet in 8°
- Optimization of working stability by using excellent nut.
- Tool dia : Ø1.8~25

Nominal designation

BT30	DSK	10	90
Spindle	Slim type collet chuck	Max. clamping dia.	Length

Multi-purpose application



Collet

General type & accuracy type	Designation	Max chacking	Runout	8° HC Collet
	HC6 - ød	6.0	General type 5µm	 8° HC collet minimize vibration
	HC10 - ød	10.0		
	HC13 - ød	13.0	Accuracy type 3µm	
	HC16 - ød	16.0		
	HC20 - ød	20.0		
	HC25 - ød	25.0		

Spanner (optional)

	Designation	Chuck
	DSS - 6	DSK 6
	DSS - 10	DSK 10
	DSS - 13	DSK 13
	DSS - 16	DSK 16
	DSS - 20	DSK 20
	DSS - 25	DSK 25

Collet extractor (Basic)

	Designation	Chuck
	DSS - 6CE	DSK 6
	DSS - 10CE	DSK 10
	DSS - 13CE	DSK 13
	DSS - 16CE	DSK 16
	DSS - 20CE	DSK 20
	DSS - 25CE	DSK 25

C This symbol means optional through coolant system

● BT : 86P ➡

OFH

NEW

Floating holder for brush



Feature

- Floating arbor with steady pressure : consecutive usage without calibration
- Balance : G6.3/Max 15,000rpm
- Prolonged brush tool life(50% longer vs collet chuck)
- Short lead time & improved productivity
- Various arbors (ISO30,40,50 / HSK)
- Various sleeve and brushes

Nominal designation

BT30	OFH	10	90
Spindle	Floating holder for brush	Max. clamping dia.	Length

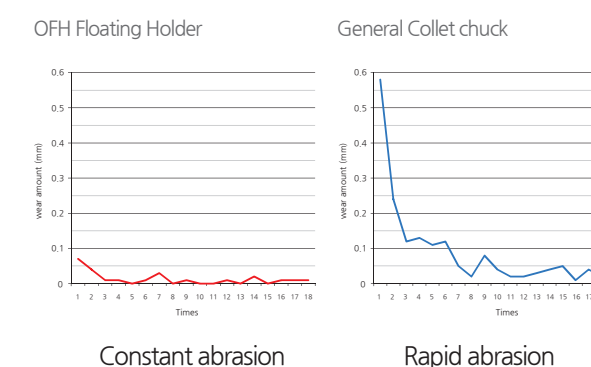
Designation

BT30-OFH06-75

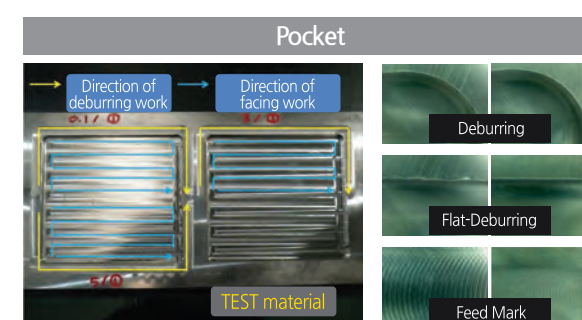
Application



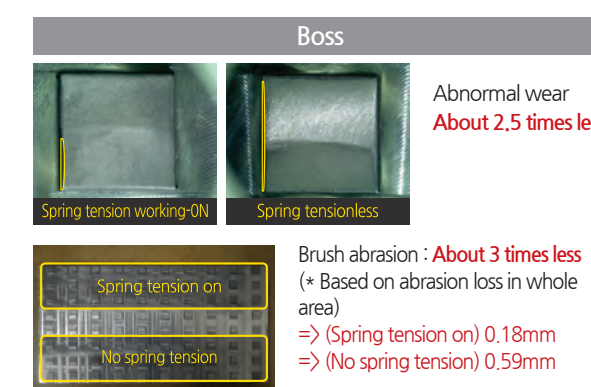
Wear performance comparison of brush.



Deburring work for aluminum



Surface roughness : 4 times improved.
0.906µm(Before) > 0.179µm(After)



DTN

Tapping holder



Feature

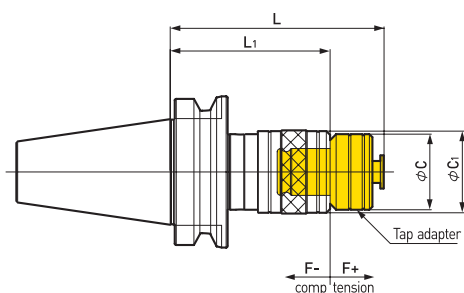
- Quick and easy for tool changing .
- Tool protection by applying torque safety device (TCA tap adapter)
- Tap range: M3~M38

Nominal designation

BT40	-	DTN	22	-	130
Spindle		Tapping holder	Max. chucking dia.		Length

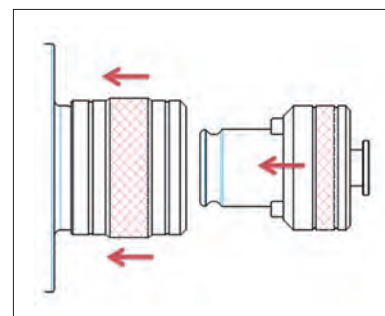
Easy TCA(Tap adapter) changing

Easy adapter changing, tension and contract in floating way in axial direction.



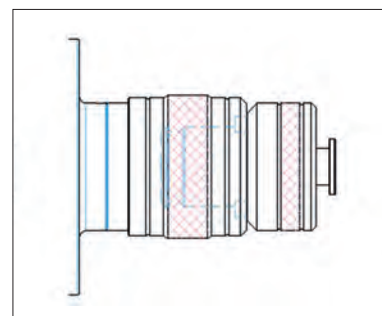
TAP Adaptor

Before installation



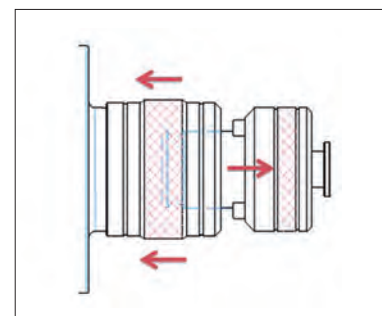
1. Press down the cover of tap holder and insert the TCA
2. Assemble TCA to fit with the key way and press until it clicks

After installation



1. The cover of the tap holder comes up to the normal position

Disassembly



1. Press the cover of tap holder and remove the TCA.

This symbol means unavailable with through coolant system

● BT : 96P S : 148P SK : 171P

DST PAT. NEW

High speed synchro tapping chuck



Feature

- Tapping chuck for high speed tapping
- Minimize synchronization error by special design
- Through coolant is applicable
- Tap range : M1~M22

Nominal designation

BT40	-	DST	22	-	100
Spindle		Tapping holder	Max. tapping range		Length



Tast

Comparison of thread shape

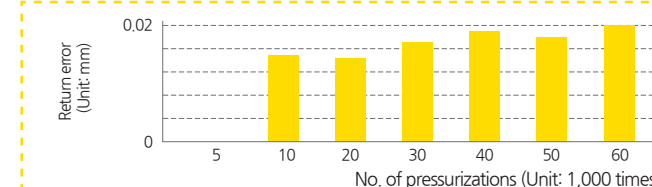
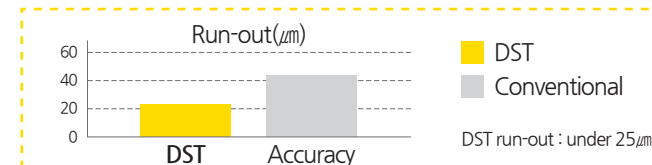


DST22
(V=100 m/min)

Excellent surface



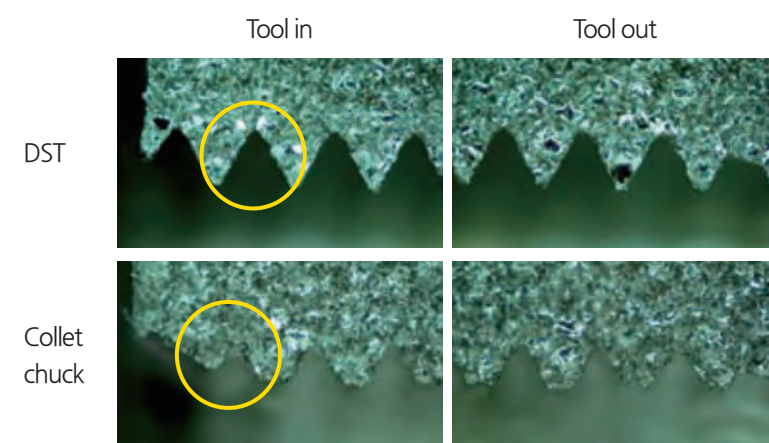
Former product



Exclusive collet for tapping

- TER collet
- DST3 = ER11 collet

Comparison of thread shape



DST

Guarantee good shape of thread

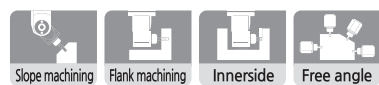
Collet chuck

Breakage of thread due to synchronization error

This symbol means optional through coolant system

● BT : 98P HSK : 157P SK : 172P

ANGULAR HEAD



Feature

- One machine can function as two machines
- Maching at various angles
- Light weight by aluminum body

Nominal designation

BT50	-	KHU	10	-	195
Spindle		Angular head	Max. chucking dia.		Length

Angular head parts (MAH)



Componets



SAH ^{NEW}

Slim angular head

3,500
Max RPM

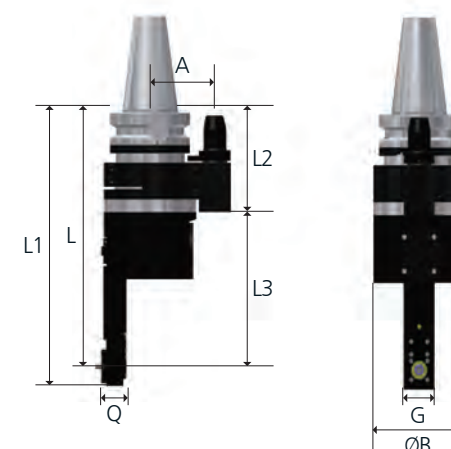
Feature

- Suitable for small hole and side milling
- Max. 3,500RPM / Torque rate(IN:OUT) 1:1.37
- Tool dia : Ø3, Ø4, Ø6

Nominal designation

BT50	-	SAH	6	-	277
Spindle		Slim angular head	Max. chucking dia.		Length

Feature



Shank	L	L1	L2	L3	A	Q	G	ØB	Torque rate (IN:OUT)	Direction of rotation	Max.RPM	W (kg)
BT50-SAH6-277	277	298	183.5	93.5	80(110)	31.5	40	76	1:1.37	CW:CW	3,500rpm	14

Clamping force

	Measure	(N-m)			
Clamp torque	2	2.5	3	3.5	4
Clamping force	Unmeasurable	5.5	6.5	7	7

※ Ideal clamping torque : 3.5N-m

Application



Clamping



1. Combination SAH and clamping vise.
2. Rotating the bolt with wrench.

ANGULAR HEAD

ANGULAR HEAD



MAH

Universal type MAH (Free angle - Reinforced series)



- Reinforced universal type for mold machining
- A stable work for large mold working.
 - Tool : Ø32 Endmill

● BT : 106P ↗



HRAG

Attachment type HRAG (Attachment - Reinforced type)



- 200% upgraded hardness from KAG
- Face mill cutter purpose

● BT : 107P ↗

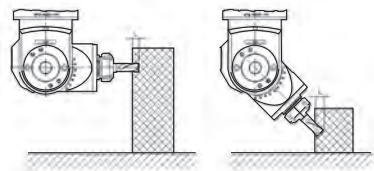


KHU

Universal type KHU (Free angle)



- Adjustable angle : 0° - 90°
- HSK, SK, CAT, GOST type : order to make



BT50-KHU20-195

● BT : 108P ↗

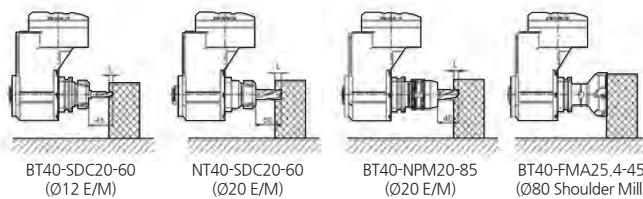


KAG

Attachment type KAG



- Adjustable angle : 360 in horizontal direction
- BT40, BT30 tool mountable
 - HSK, SK, CAT, GOST type : order to make



BT40-SDC20-60
(Ø12 E/M)

NT40-SDC20-60
(Ø20 E/M)

BT40-NPM20-85
(Ø20 E/M)

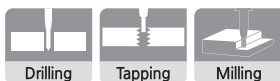
BT40-FMA25.4-45
(Ø80 Shoulder Mill)

● BT : 109P ↗

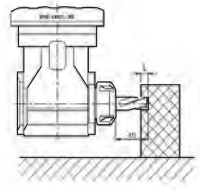


KAH

Modular type KAH (90° type)



- Adjustable angle : 360° in horizontal direction
- Please contact before using exclusive tap collet
 - HSK, SK, CAT, GOST type : order to make



BT50-KAH20-200

● BT : 110P ↗



KAC

Modular type KAC (45° type)



- Adjustable angle : 360° in horizontal direction
- HSK, SK, CAT, GOST type : order to make

● BT : 111P ↗

FBH/B

FBH back boring & balanced type



Feature

- High speed boring & back boring
- Balance : G2.5
- Adjustable range : 2 μ m

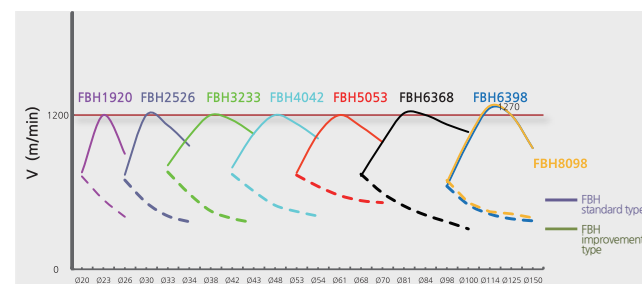
Nominal designation

FBH	32	33	B
Fine boring head	MD No.	Minimum Boring dia	Balance type

Max. speed by dia

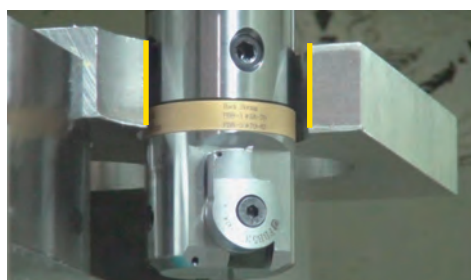
FBH allowed speed

HOLDER : HSK63A (G2,5)



Back boring

Before cutting

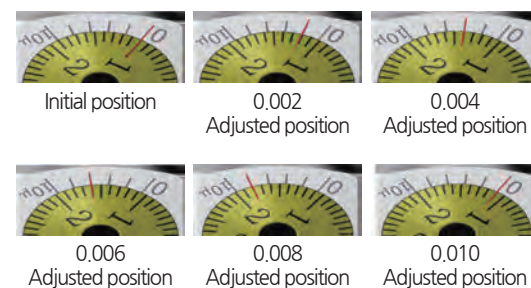


After cutting



Adjustment

2 μ m boring range



Changing cutting direction



It is easy to change cutting direction

TBC

Balance cut tool for rough boring



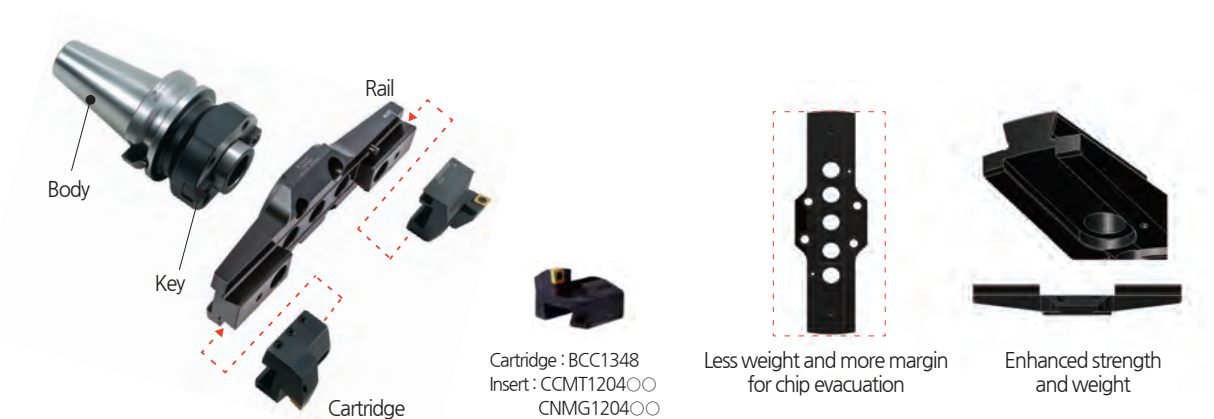
Feature

- Wide boring range for big diameters : ϕ 130 ~ ϕ 540mm
- Stable structure against cutting load
 - Assembly in dove-tail structure
- Interchangeable headset with FBC
 - Common boring head and rail and different cartridge
- Light-weight

Nominal designation

BT50	-	FMD50	-	85	+	TBC	130S
Body					Head set		

Structure



Less weight and more margin for chip evacuation

Enhanced strength and weight

TBC Boring Tool Cutting condition

Work-piece	SPEC.	Cutting condition		
		Grade	Vc (m/min.)	Feed f (mm/rev.)
AL	ADC12	"N" class	200~500	0.08~0.25
Mild steel	SS41(HB160)	"P" class	100~250	0.08~0.20
Steel	S45C(H250)	"P" class	80~200	0.08~0.25
Stainless Steel	SUS304	"M" class	80~150	0.05~0.15
Cast-iron	FC25(HB250)	"K" class	100~300	0.08~0.25

Boring range

Designation	Boring Dia(ϕ)		Body	Head Set	Insert
	min	max			
TBC130	130	180	FMD50	TBC130S	CCMT120400
TBC175	175	225	FMD50	TBC175S	CCMT120400
TBC220	220	270	FMD50	TBC220S	CCMT120400
TBC265	265	315	FMD50	TBC265S	CCMT120400
TBC310	310	390	FMD50	TBC310S	CCMT120400
TBC385	385	465	FMD50	TBC385S	CCMT120400
TBC460	460	540	FMD50	TBC460S	CCMT120400

This symbol means built-in through coolant system

● BT : 116P S : 146P SK : 177P

● BT : 118P SK : 178P

FBC

Balance cut tool for fine boring



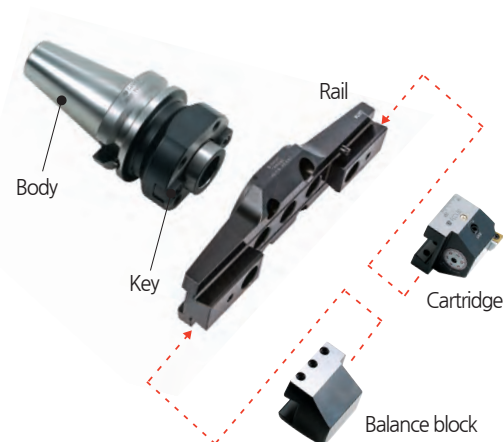
Feature

- Wide boring range for big diameters
- Ø130 ~ Ø540mm.
- Interchangeable headset with TBC
- Common boring head and rail and different cartridge [micro cartridge + balancing block]
- Various Insert
- Applicable insert : CCMT09T3/1204, TPMT1103

Nominal designation

BT50 - FMD50 - 85 + FBC 130S
Body Head set

Structure



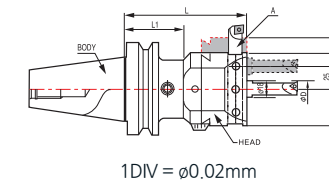
FBC boring range

Designation	Boring Dia(φ)		Head Set	Insert
	min	max		
FBC130	130	180	FBC130S(TBR130+FCC130+FCB130)	FBB130-C09 (CCMT09T300, CCGT09T300 FBB130-C12 (CCMT120400) FBB130-T11 (TPMT110300,TPGT110300L)
FBC175	175	225	FBC175S(TBR175+FCC130+FCB130)	
FBC220	220	270	FBC220S(TBR220+FCC130+FCB130)	
FBC265	265	315	FBC265S(TBR265+FCC130+FCB130)	
FBC310	310	390	FBC310S(TBR310+FCC310+FCB310)	
FBC385	385	465	FBC385S(TBR385+FCC310+FCB310)	
FBC460	460	540	FBC460S(TBR460+FCC310+FCB310)	

● BT : 118P ↗ SK : 178P ↗

KMB

Micro boring



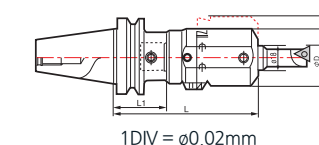
- Modular type micro boring head
- Adjustable range : 20μm
- Boring range : Ø8.0~Ø101.0mm
- Adjustable length : 17mm
- Applicable shank : HSK, BT, SK

■ This symbol means unavailable with through coolant system

● BT : 122P ↗ HSK : 162P ↗ SK : 180P ↗

SMB

Small micro boring bar



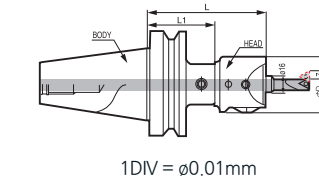
- Modular type micro boring head
- Adjustable range : 20μm
- Boring range : Ø8.0~Ø38.0mm
- Adjustable length (Small and deep) : 10mm
- Applicable shank : HSK, BT, SK, NT

■ This symbol means unavailable with through coolant system

● BT : 122P ↗ HSK : 162P ↗ SK : 180P ↗

SMH

Small micro boring bar



- Modular type micro fine boring head
- Adjustable range : 10μm
- Boring range : Ø5.5~Ø33.0mm
- Adjustable length : 7mm
- Applicable shank : HSK, BT, SK

■ This symbol means optional through coolant system

● BT : 122P ↗ HSK : 162P ↗ SK : 180P ↗

Advantages

cBN has excellent hardness and thermal resistance. It is sintered with extremely high pressure and temperature after adding a special ceramic binder into the main material of cBN. DINOX cBN has excellent solidity and wear resistance making it optimal for cast iron and hardened steel. The best choice for productivity improvement.



cBN Insert type

Multi corner type coating



2NU-CNGA120408

- Simple corner management
- Special PVD coating
- Longer tool life

One use type



NU-CNGA120408

- Economical price
- Simple management
- Stable cutting performance by strong welding
- Various series

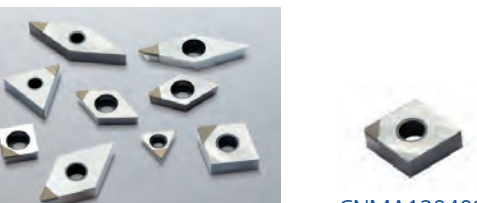
Multi corner type



4NU-CNGA120408

- Multiple cBN corners in 1 insert
- Multiple application is available
- Cost down

Regrinding type



CNMA120408

- Stable long Tool life
- Excellent wear resistance and hardness
- Tool cost saving : 3~4 times of re-grinding

cBN type



Regrinding type One use type Multi corner type Multi corner type (coated) Solid Type Special Type

Uses of product and structure features

Features	cBN Content	Hardness	Grade	Work piece	Features
	High ▲ ↓ Low	44 ▲ ↓ 21	KB370 KB800 KB7000 KB7500	Carbide alloy Chilled iron Ni-hard iron Heat-resistant alloy, cast	• High content of cBN, Strong binding among cBN particles • Great performance in cutting of super-hard materials such as cast iron, alloy and carbide alloy
			KB1000 KB2000 KB410 KB420 KB425 KB210	Alloy, Cement Steel, Carbon tool steel, Bearing steel, Dies steel, Ductile cast iron	• Strong binding of CBN particle with special ceramic binder • Great wear resistance and endurance in cutting of heat treated steel and cast iron by high cBN content

Characteristics

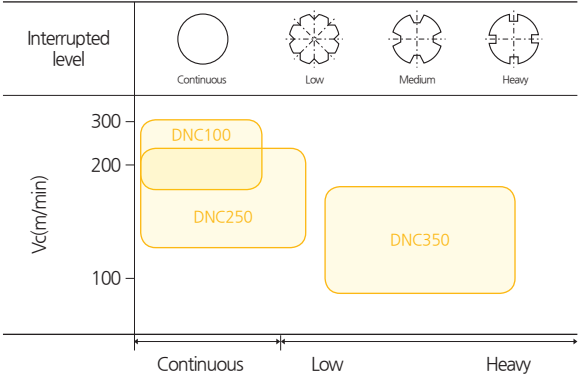
Categorization	Grade	Structure	Binder	cBN Content (%)	Particle Size (μm)	Hardness HV	TRS (Gpa)
Coated	DNC100		TiN	50 - 55	2	31 - 34	1.05 - 1.15
	DNC250		TiC	65 - 70	4	32 - 34	1.00 - 1.10
	DNC350		TiN	60 - 65	1	33 - 35	1.20 - 1.30
Heat treated steel	KB410		TiCN	40 - 45	3	27 - 31	0.80 - 0.90
	KB1000		TiCN	40 - 45	1	27 - 31	0.90 - 1.00
	KB420		TiN	55 - 60	3	31 - 33	0.95 - 1.10
	KB425		TiN	65 - 70	4	29 - 31	1.00 - 1.10
	KB320		TiN	50 - 55	2	31 - 34	1.00 - 1.10
	KB2000		TiN	50 - 55	2	31 - 34	1.05 - 1.15
	KB335		TiN	60 - 65	1	33 - 35	1.20 - 1.30
Sintered parts	KB370		CO Compound	90 - 95	2	40 - 43	1.20 - 1.30
	KB370		CO Compound	90 - 95	2	40 - 43	1.20 - 1.30
Cast iron	KB370		CO Compound	90 - 95	2	40 - 43	1.20 - 1.30
	KB350		TiC	65 - 70	6	32 - 34	1.00 - 1.10

cBN material features and cutting condition

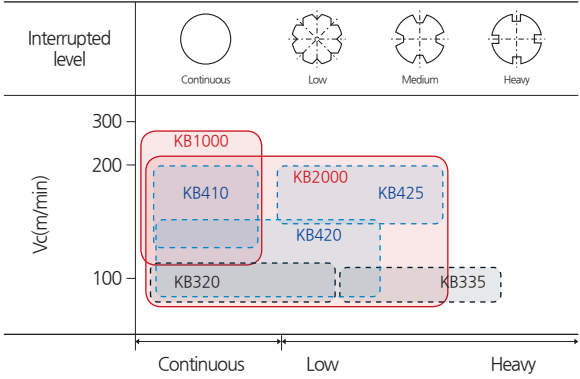
Material type			Insert color	Use	Cutting condition							
Categori- zation	Coated status	Grade			Vc (m/min)					feed	ap	
					0	50	100	150	200	250		
H Hardened steel	Coated	DNC100	 Dark brown color	Continuous	180 300					0.03 -0.30	0.03 -0.3	
		DNC250	 Gold color	Continuous high speed cutting	120 220					0.05 -0.30	0.05 -0.3	
		DNC350	 Dark brown color	Medium~heavy interrupted cutting	90 150					0.05 -0.30	0.05 -0.25	
	Non coated	KB410	 Dark brown color	Continuous high speed cutting	150 200					0.03 -0.13	0.03 -0.2	
		KB1000		Continuous high speed cutting	130 250					0.03 -0.15	0.03 -0.2	
		KB420		High performance cutting	120 150					0.03 -0.30	0.03 -0.5	
		KB425		High speed interrupted cutting	150 200					0.03 -0.30	0.03 -0.5	
		KB320		Low ~ medium interrupted cutting	80 120					0.03 -0.20	0.03 -0.3	
		KB2000		Low ~ medium interrupted cutting	80 200					0.03 -0.20	0.03 -0.3	
		KB335		Heavy interrupted cutting	80 110					0.03 -0.20	0.03 -0.3	

Application

Coating



None coating



Use and features of cBN materials

Material type			Insert color	Use	Features
Categorization	Coated status	Grade			
K Cast iron	Non coated	KB370		High speed cutting of FC/Milling cutting of FC Cutting of Hardened iron parts Hard material roll cutting/ Heat resistant alloy cutting	High percentage of cBN. Material with high solidity and heat conductivity by optimizing small connective tissue
		KB350		FC, FCD cutting, Hard VSR cutting, Hard roll finishing cutting	Optimal structure of small connective tissue of cBN for cast iron cutting. Excellent wear resistance and fracture resistance
		KB800		High depth cutting, finishing processing high precision	Solid structure enabling use of whole insert as cutting edge. Great performance in rough machining which was difficult for previous brazing type. Also available for high speed surface cutting

Processing test cases

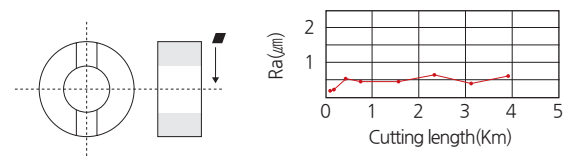
KB350 TEST RESULT

Parts name and work piece material	Grade	KB350	Competitor cBN
	Insert	SPGN090308	SPGN090308
Crank bore FC250 = FCD450 Inner boring	Vc (m/min)	150	
	Fn (mm/rev)	0.15	
	D.O.C (mm)	0.5	
	Dry/Wet	Wet type	



KB350 TEST RESULT

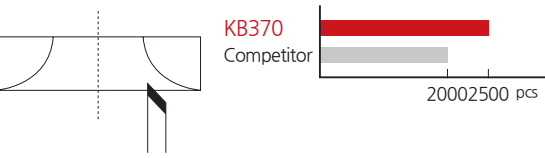
Parts name and work piece material	Grade	KB350	Ceramic
	Insert	CNMA120412	
Compressor comp. FC250 Facing, Interrupted	Vc (m/min)	400	
	Fn (mm/rev)	0.07	
	D.O.C (mm)	0.15	
	Dry/Wet	Wet type	



KB350 : under 0.8μm, Ceramic : over 1.5μm

KB370 TEST RESULT

Parts name and work piece material	Grade	KB370	Competitor cBN
	Insert	Special bite	
VSR intake Hv250-330 Plunge cutting	Vc (m/min)	95	
	Fn (mm/rev)	0.08	
	D.O.C (mm)	0.2	
	Dry/Wet	Dry type	



KB370 TEST RESULT

Parts name and work piece material	Grade	KB370	Competitor cBN
	Insert	SPGN090308	TNGA150408
Fly wheel FC300 Facing	Vc (m/min)	600	
	Fn (mm/rev)	0.15	
	D.O.C (mm)	0.2	
	Dry/Wet	Wet type	



DNC100

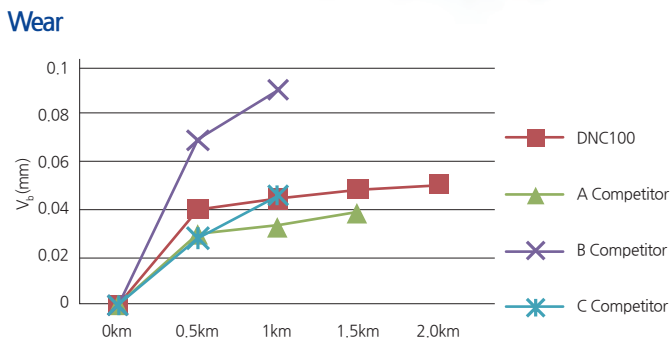
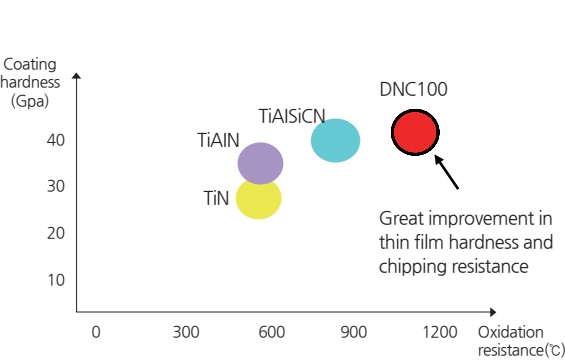
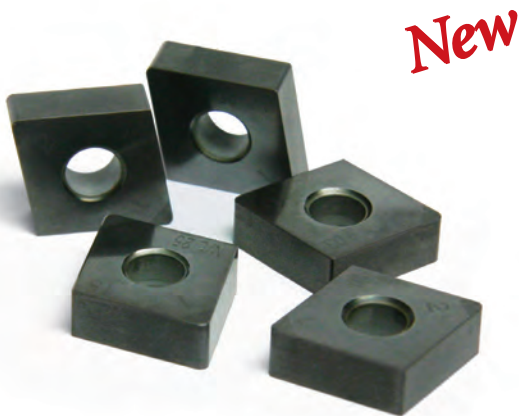
NEW

Coating cBN

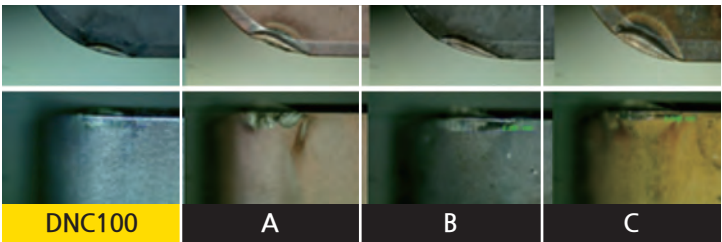


Feature

- High hardness Coating
- Excellent wear and Oxidation resistance for high speed and continuous cutting



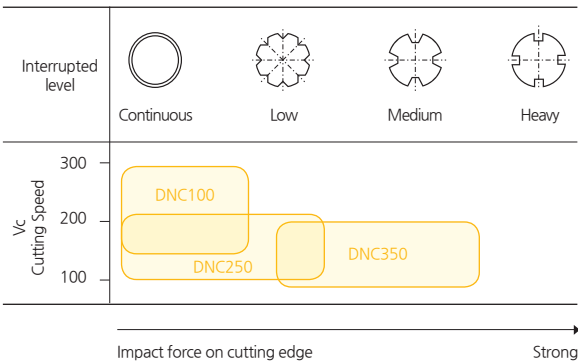
Test



Condition

Insert = 2NU-CNGA120408
Holder = DCLNL2525-M12
Material = SCM415 (58~62HrC)
Cutting speed = 300m/min
Feed = 0.1mm/rev
D.O.C. = 0.1mm
Dry/ Continuous

Application



Recommended cutting condition

Vc (m/min)	DNC100	180	300
Fn (mm/rev)	DNC100	0.03	0.3
D.O.C (mm)	DNC100	0.03	0.3

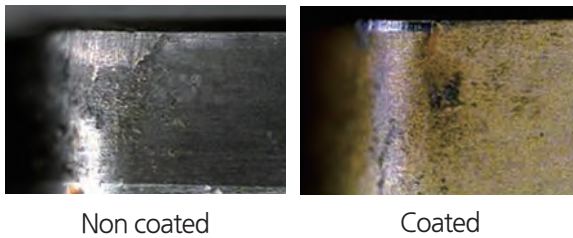
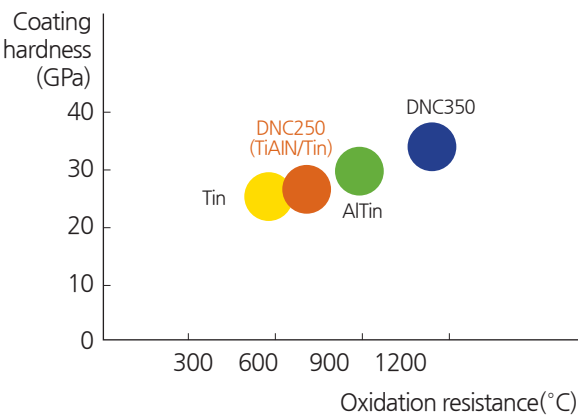
DNC250

Coating cBN

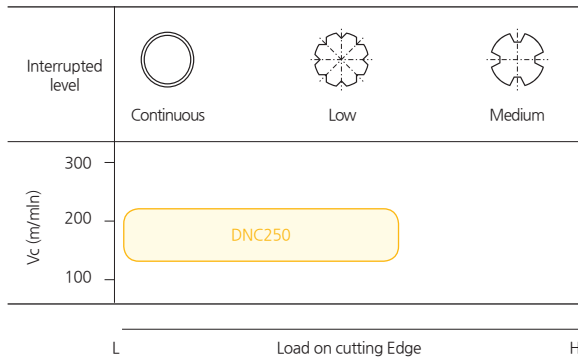


Feature

- New PVD Coating
- Excellent wear resistance



Application area



Recommended cutting condition

Vc (m/min)	120	220
Fn (mm/rev)	0.05	0.3
D.O.C (mm)	0.05	0.3

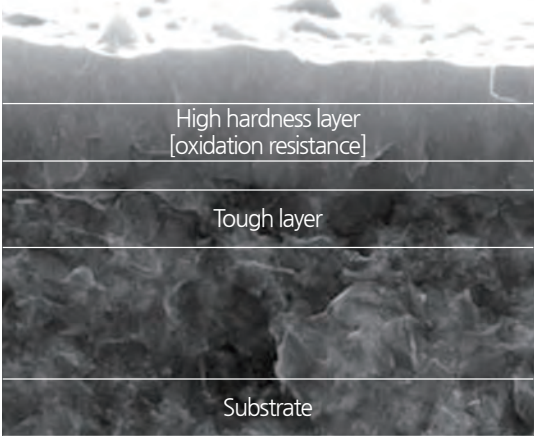
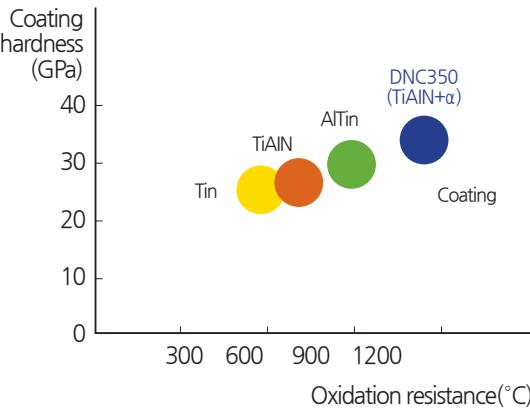
DNC350

Coating cBN

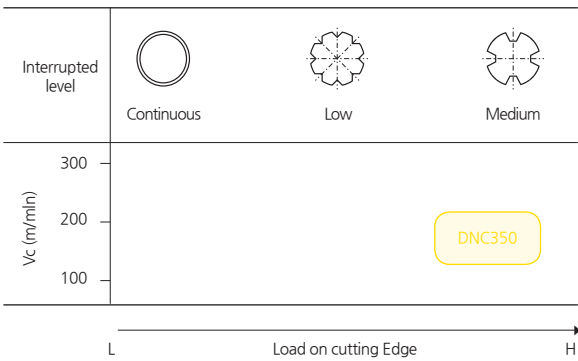


Feature

- New coated cBN grade for medium interrupted
- New PVD coating [TiAlN+α]
- TiAlN coating provides overall chipping and wear resistance
- Tough cBN substrate offers prolonged tool life



Application



Recommended cutting condition

Vc (m/min)	120	150
Fn (mm/rev)	0.05	0.3
D.O.C (mm)	0.05	0.25

KB1000



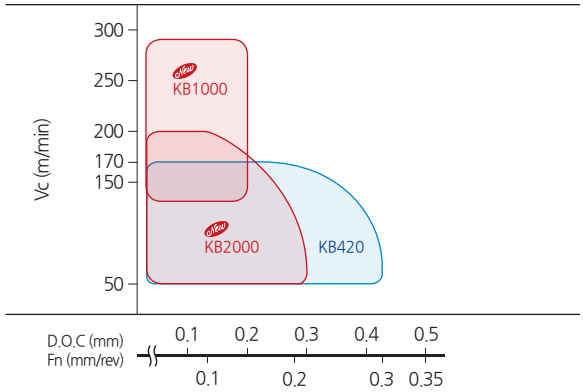
Feature

- Stable tool life in continuous and low interrupted of hardened steel
- Great wear resistance using high purity ceramic binder

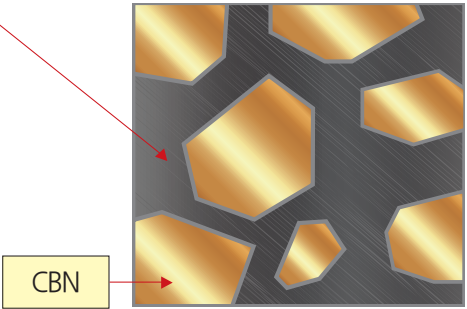


Application

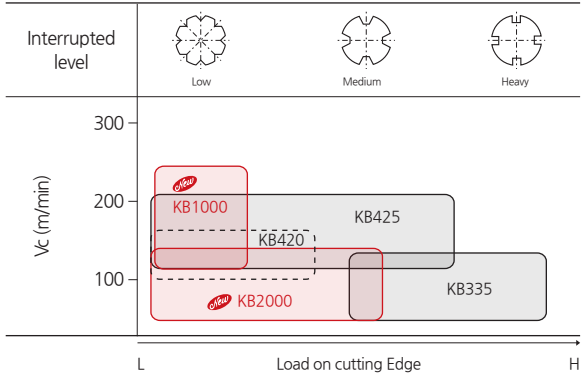
Continuous cutting



High purity ceramic binder



Interrupted cutting of hardened steel



Recommended cutting condition

Vc (m/min)	
50	100 120 150 200 250 300
130	250
Fn (mm/rev)	D.O.C (mm)
0.03 ~ 0.15	0.03 ~ 0.2

※ Cutting oil : Continuous cutting : Dry, Wet
Interrupted cutting : Dry

KB2000

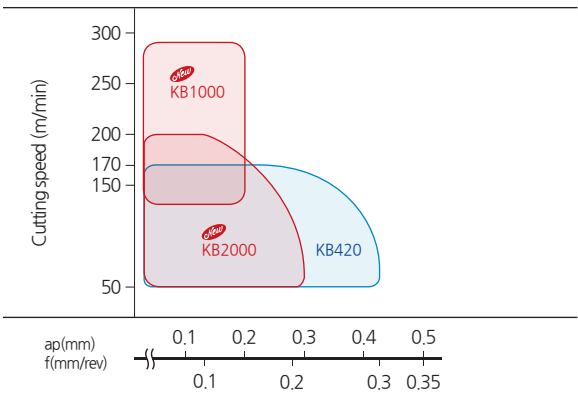


Feature

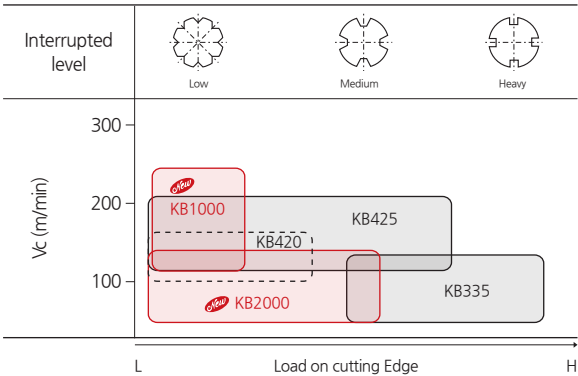
- Stable tool life in low~medium interrupted of hardened steel
- Great chipping resistance using high purity ceramic binder

Application

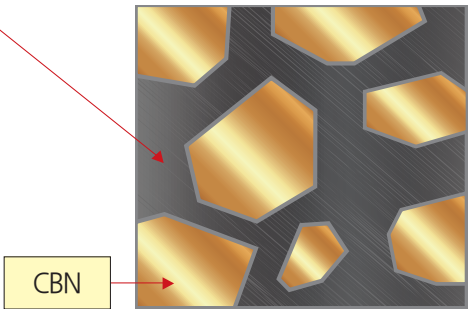
Continuous cutting



Interrupted cutting of Hardened steel



High purity ceramic binder



KB2000

Vc (m/min)	
50	300
80	200
Fn (mm/rev)	
0.03 ~ 0.2	0.03 ~ 0.3
D.O.C (mm)	
0.03 ~ 0.2	0.03 ~ 0.3

※ Cutting oil : Continuous cutting : Dry, Wet
Interrupted cutting : Dry

DNC400 NEW

Solid type coating cBN



Feature

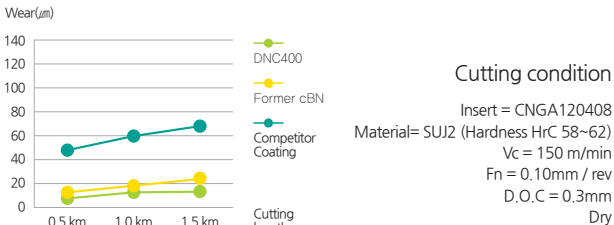
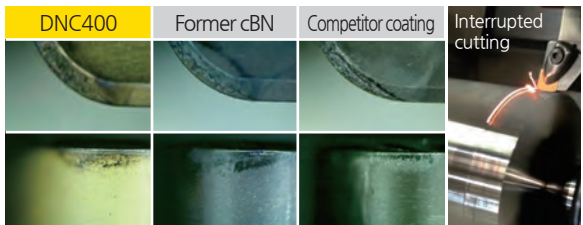
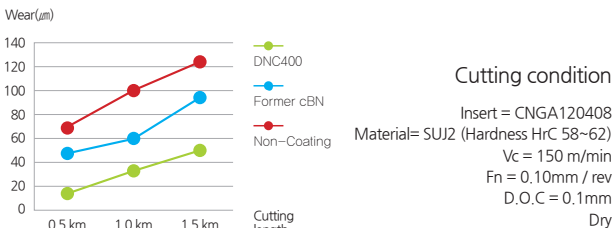
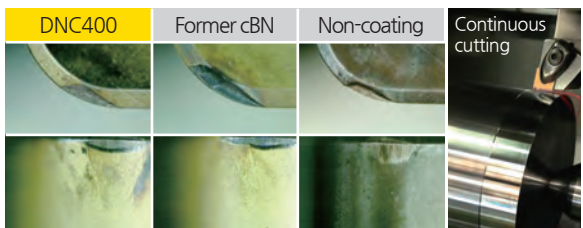
- Max.D.O.C = 0.5mm
- Excellent tool-life : new PVD coating

Advantage

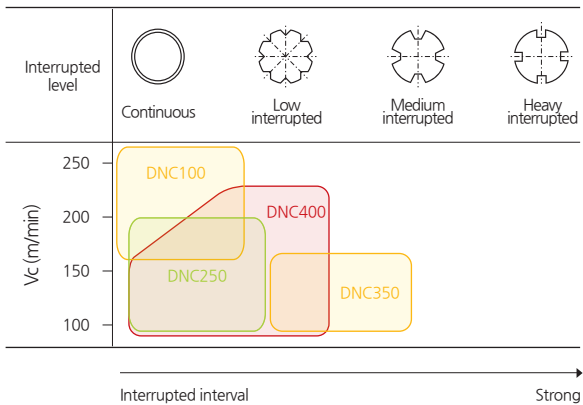
- Enhanced productivity by high speed and more depth
- Excellent on carburized part and welded part
- Stability by 3 side brazing



Test



Application



Comparison

Fn (mm/rev)	DNC400	0.05	0.30
	DNC250	0.05	0.30
	DNC350	0.05	0.30
D.O.C (mm)	DNC400	0.05	0.50
	DNC250	0.05	0.30
	DNC350	0.05	0.30

KB400

Solid type cBN

Continuous

Moderately

0.5mm
Max depth

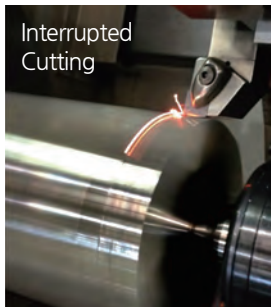
Feature

- Solid corner type
- Max. D.O.C. = 0.5mm
- Excellent wear resistance and fracture resistance

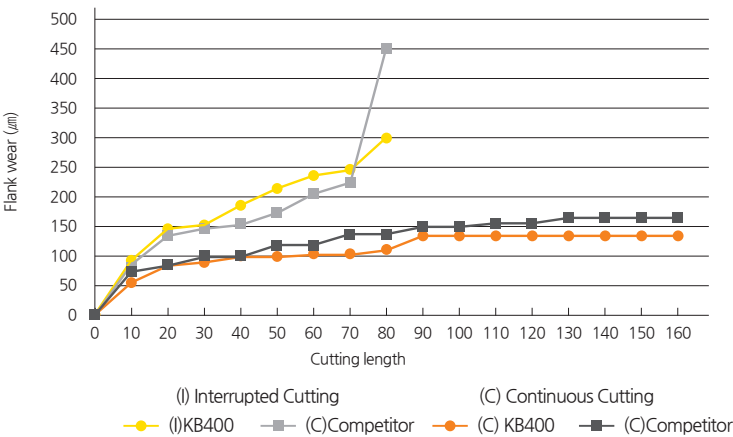


Test

Vc (m/min)	150 m/min.
Fn (mm/rec)	0.10 mm/rev
Insert	2NS-CNGA120408
Material	SCM440(H)
Hardness	55~60 HRC
Coolant	Dry



Type	KB400	Competitor cBN
Continuous Cutting		
Interrupted Cutting		



Recommended cutting condition

Vc (m/min)	120	220
Fn (mm/rev)	0.1	0.3
D.O.C (mm)		0.5

ROT

Run-out tester

ISO
Shank

200mm=3μm

Feature

- Various shanks compatible, plus wide lineup
 - Applicable from ISO 30 to ISO50 (ISO: BT,SK,NT,CAT)
- General type available at affordable price, and multi type for measuring both edge heightand outerdiameter at once



Designation

ROTS	ROTM
ROTS-ISO30	ROTM-ISO30
ROTS-ISO40	ROTM-ISO40
ROTS-ISO50	ROTM-ISO50

Part list

BASIC				OPTION		
Shank	Body	Housing	Retainer	Test bar	Arm	Indicator
ISO50	ROTM-BD (Multi type) ROTS-BD (General type)	ROT-HS-ISO50	ROT-RT-ISO50	BTN50-50-300	MB -1030-2	DIAL GAUGE (0.002mm)
ISO40		ROT-HS-ISO40	ROT-RT-ISO40	BTN40-50-300		
ISO30		ROT-HS-ISO30	ROT-RT-ISO30	BTN30-30-200		

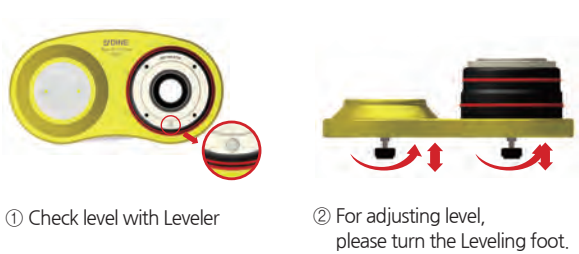
Easy measurement

Mounting and spinning, that's all to run-out measurement.

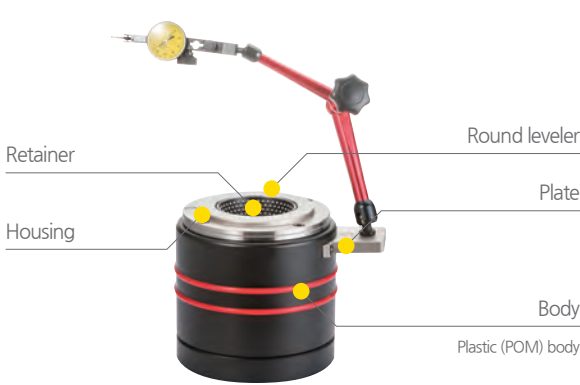


Easy control for horizontal level (ROTM)

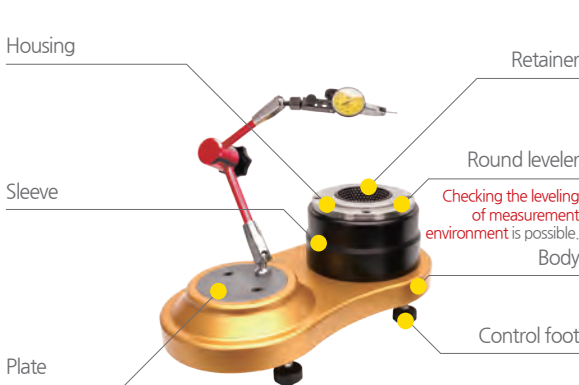
Easy adjustedment with anti-vibration pad



ROTS-General type (~Ø150)



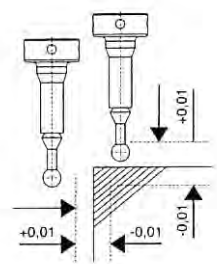
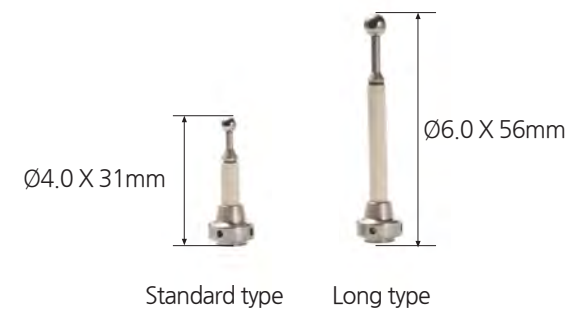
ROTM-Multi type (~Ø400)



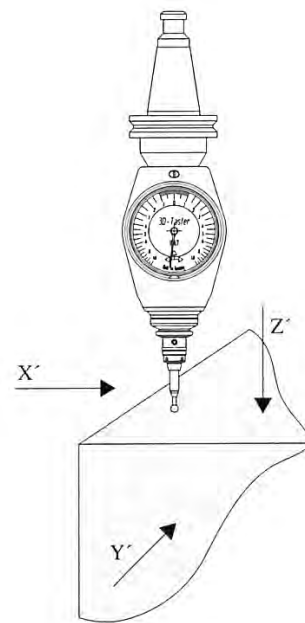
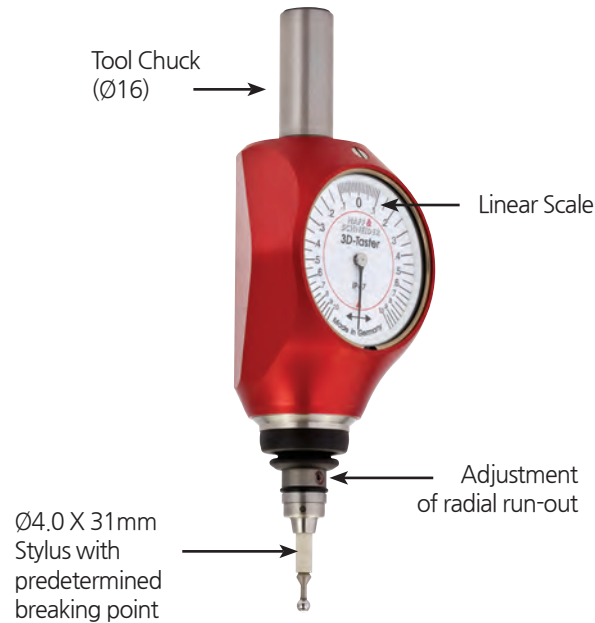
NEW 3D-TASTER

Feature

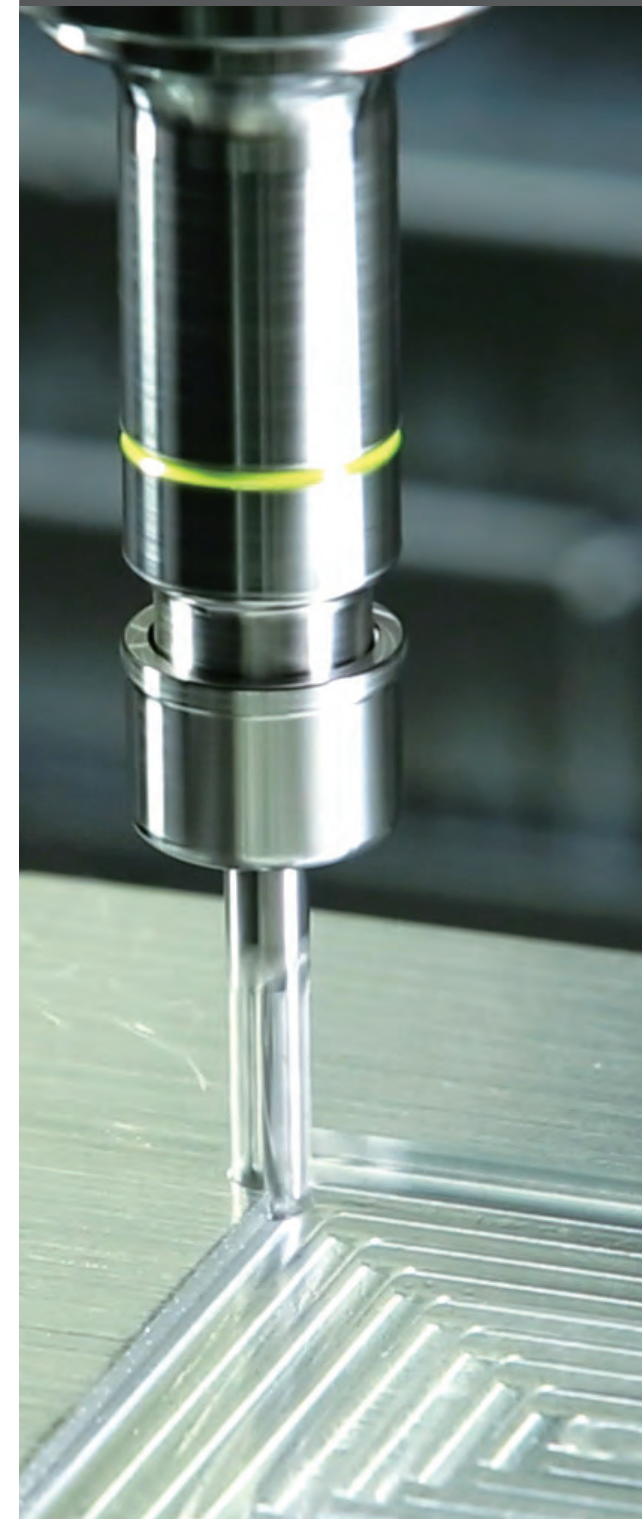
- High measuring accuracy : 0.01mm
- Waterproof and anti-vibration structure.
- Prevention of stylus loss by the shock and vibration on stylus in screw clamping system
- Simple and accurate measurement of radius run-out, and measuring radius run-out directly by lower scanning arm.
- Measurement in radial and axial direction by an indicator.



축	Tolerance
X	(+/-)0.01
Y	(+/-)0.01
Z	(+/-)0.01



BT SHANK



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DTN	96	INSERT	135
TCA	97	BCF	136
DST	98	FF	138
TER	99	FF UNIT SPARE PART	139
SLA	100	PULL STUD BOLT	140

Hydraulic expansion chuck

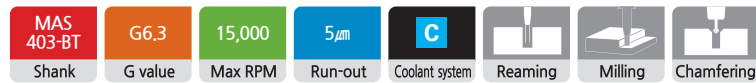


Fig.1

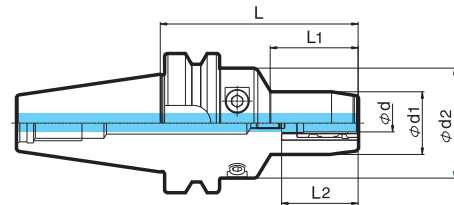
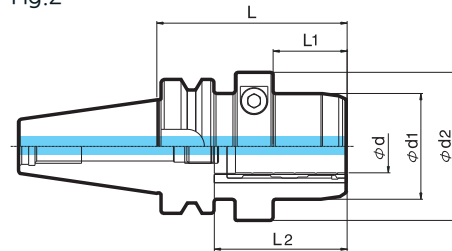


Fig.2



 This symbol means built-in through coolant system

L2 : tool insertion depth(Min.~Max)

- Features, see page29
- Collet, see page62
- Spare part, see page63

[illegible]

Hydraulic expansion chuck



Fig.1

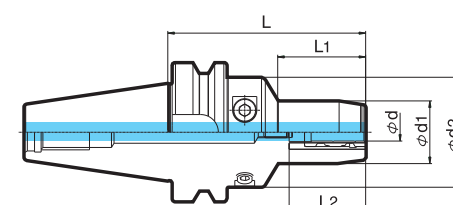
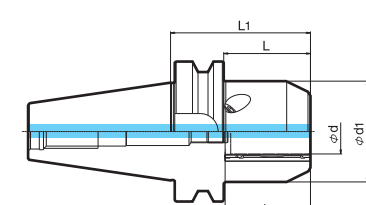


Fig.2



 This symbol means built-in through coolant system

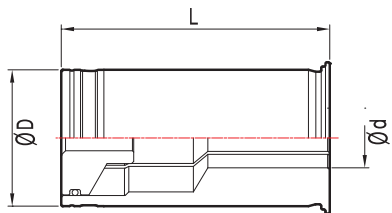
L2 : tool insertion depth (Min.~Max)

- Features, see page29
- Collet, see page62
- Spare part, see page63

[illegible]

DHC COLLET(GENERAL TYPE)

Collet(General type)



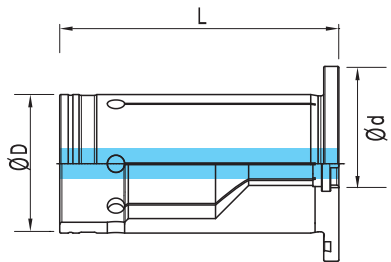
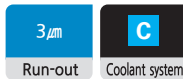
● Except for below sizes, other size is made by order.

C This symbol means unavailable with through coolant system

Designation	ØD	Ød	L
DHC12 - 3, 4, 5, 6, 8	12	3, 4, 5, 6, 8	47
DHC20 - 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16	20	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16	52
DHC32 - 6, 8, 10, 12, 14, 16, 18, 19, 20, 25	32	6, 8, 10, 12, 14, 16, 18, 19, 20, 25	63

DHJ COLLET (JET COOLANT)

DHJ Jet coolant collet (Accuracy type)

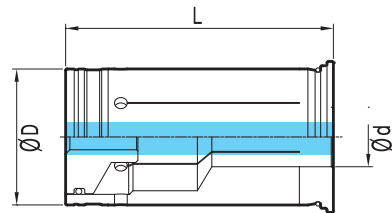


C This symbol means built-in through coolant system

Designation	ØD	Ød	L
DHJ20- 6, 8, 10, 12, 14, 16	20	6, 8, 10, 12, 14, 16	47

DHC COLLET(THROUGH COOLANT TYPE)

Coolant collet(accuracy type)



C This symbol means built-in through coolant system

● Except for below sizes, other size is made by order.

Designation	ØD	Ød	L
DHC12 - 3(P), 4(P), 5(P), 6(P), 8(P)	12	3, 4, 5, 6, 8	47
DHC20 - 3(P), 4(P), 5(P), 6(P), 7(P), 8(P), 9(P), 10(P), 11(P), 12(P), 14(P), 16(P)	20	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16	52
DHC32 - 6(P), 8(P), 10(P), 12(P), 14(P), 16(P), 18(P), 19(P), 20(P), 25(P)	32	6, 8, 10, 12, 14, 16, 18, 19, 20, 25	63

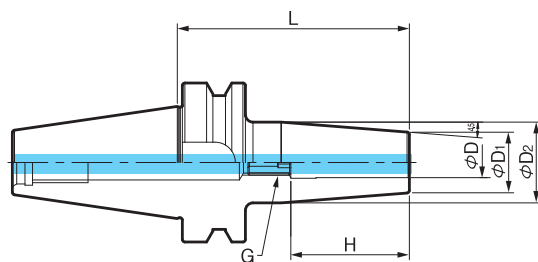
C This symbol means built-in through coolant system

DHE SPARE PART

Hydraulic expansion chuck spare part

Spare Part		Basic			
Chuck	Type	Clamp bolt	Wrench	Chuck	Adjust screw
BT30 / SK30 / HSK50	DHE 6, 8, 10, 12	DHE-M8(C)	DHETW-4	DHE 6, 8, 10	DHE-M5 (ADJ)
	DHE 14, 16, 18, 20	DHE-M10(C)	DHETW-5		
BT40 / BT50 / SK40 / SK50 / HSK63A / HSK100A	DHE 6, 8, 10, 12, 14, 16, 18, 20	DHE-M10(C)	DHETW-5	DHE 12, 14, 16, 18, 20	DHE-M10 (ADJ)
	DHE 25, 32	DHE-M12(C)	DHETW-6		

Shrinking chuck



 This symbol means built-in through coolant system

- Features, see page 24

24P 

- Adjust screw, see page 70

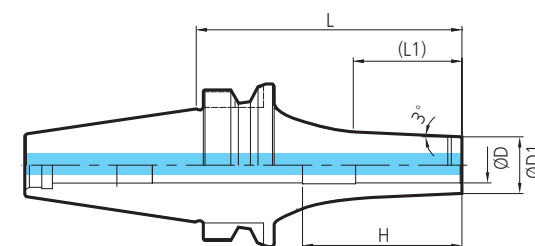
70P

[illegible]

BT-DSC/M MONO CURVE TYPE

Shrinking chuck

NEW



C This symbol means built-in through coolant system

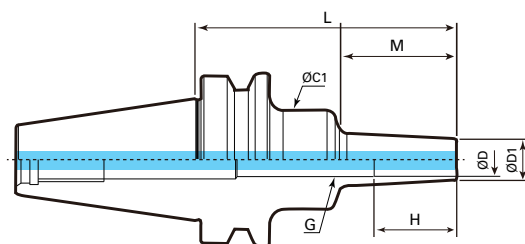
- Features, see page24.

24P 7

※ Do not use adjust screw

[illegible]

Shrinking chuck



 This symbol means built-in through coolant system

- Features, see page 24

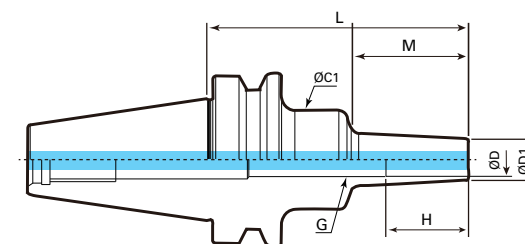
24P ↗

- Adjust screw, see page 70

70P

[illegible]

Shrinking chuck



 This symbol means built-in through coolant system

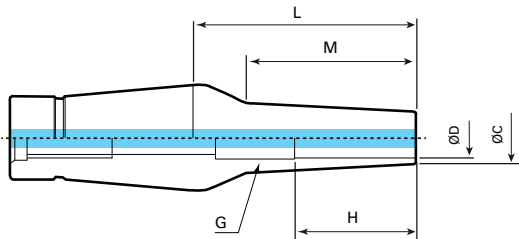
- Features, see page24.

24P 

※ Do not use adjust screw

[illegible]

CS/CM 2PIECES TYPE
Shrinking chuck



● Features, see page24 24P ➔
※ Do not use adjust screw

C This symbol means built-in through coolant system

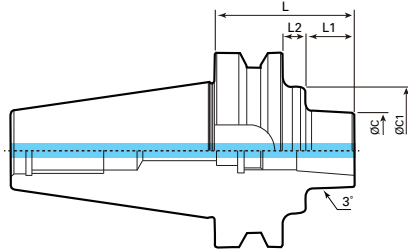
CS	Designation	ØD	ØC	L	M	H
	CS12-6-35	6	9	35	22	18
	CS12-6-55	6	9	55	42	18
	CS12-6-80	6	9	80	67	18
	CS12-6-110	6	9	110	97	18
	CS12-8-35	8	11	35	22	24
	CS12-8-55	8	11	55	42	24
	CS12-8-80	8	11	80	67	24
	CS12-8-110	8	11	110	97	24
	CS12-10-35	10	13	35	22	30
	CS12-10-55	10	13	55	42	30
	CS12-10-80	10	13	80	67	30
	CS12-10-110	10	13	110	97	30
	CS12-12-35	12	15	35	22	30
	CS12-12-55	12	15	55	42	30
	CS12-12-80	12	15	80	67	30
	CS12-12-110	12	15	110	97	30

● Features, see page24 24P ➔
● Adjust screw, see page 70 70P ➔

C This symbol means built-in through coolant system

CM	Designation	ØD	ØC	L	M	H
	CM12-6-35	6	12	35	22	18
	CM12-6-55	6	12	55	42	18
	CM12-6-80	6	12	80	67	18
	CM12-8-35	8	14	35	22	24
	CM12-8-55	8	14	55	42	24
	CM12-8-80	8	14	80	67	24
	CM12-10-35	10	16	35	22	30
	CM12-10-55	10	16	55	42	30
	CM12-10-80	10	16	80	67	30
	CM12-12-35	12	20	35	22	30
	CM12-12-55	12	20	55	42	30
	CM12-12-80	12	20	80	67	30

BT-SLK 2PIECES TYPE
Shrinking chuck



● Features, see page24 24P ➔
※ BT30-SLK12-35 need exclusive pull stud bolt.

C This symbol means built-in through coolant system

BT30, BT40, BT50	Designation	L	ØC	L1	L2	ØC1
	BT30-SLK12-35	35	38	13	-	-
	BT40-SLK12-45	45	38	18	-	-
	BT40-SLK12-45F	45	41	18	-	-
	BT40-SLK12-75	75	38	48	-	-
	BT40-SLK12-75F	75	41	48	-	-
	BT40-SLK12-135F	135	41	108	-	-
	BT50-SLK12-75	75	38	25	12	65
	BT50-SLK12-75F	75	41	25	12	65
	BT50-SLK12-105F	105	41	55	12	65
	BT50-SLK12-135F	135	41	85	12	65
	BT50-SLK12-225	225	38	150	37	65
	BT50-SLK12-315	315	38	150	127	90

Shrinking chuck spare part

BT-CPM

Champion milling chuck



BASIC

Adjust screw

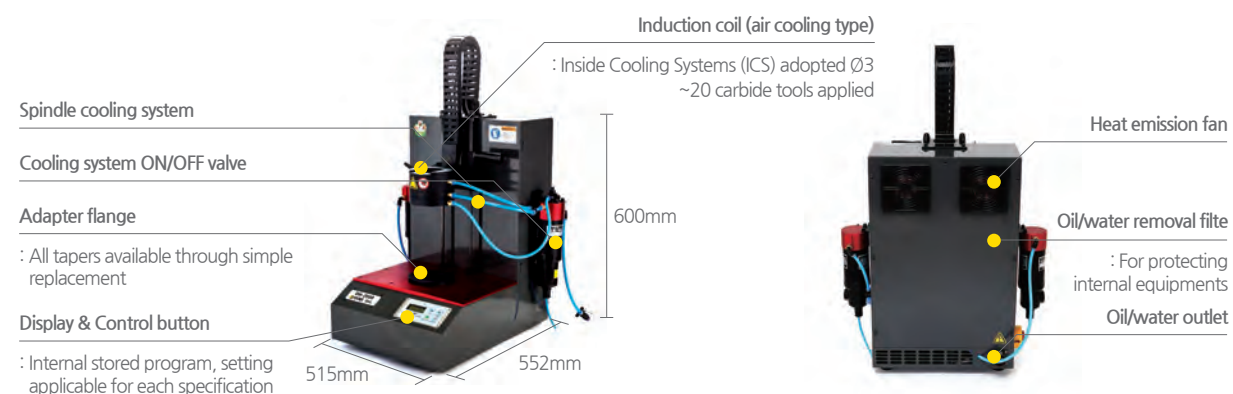


Basic										
Type	DSC6	DSC8	DSC10	DSC12	DSC14	DSC16	DSC18	DSC20	DSC25	DSC32
Adjust screw	M520C		M820C		M1230C					

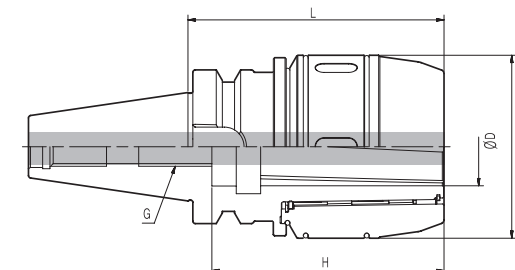
OPTIONAL

HEATING DEVICE _ DH-2000

- Shrinkage device for mass-production line
- It can be operated more than 120 times continuously



- Features, see page 25 **25P** 



- | | | | | | |
|-----------------------|----------------------------|--------------------------|----------------|---|---|
| MAS
403-BT | 15μm | 130~500
kgf·m | C |  |  |
| Shank | Run-out | Clamping Force | Coolant system | Drilling | Reaming |

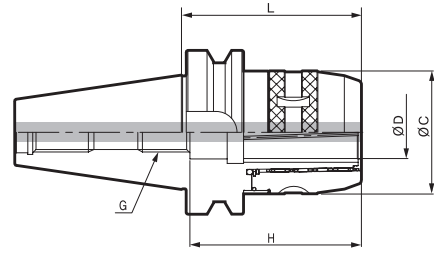
C This symbol means optional through coolant system

- Features, see page 27 27P 
- ※ Set, can be made by order

[illegible]

New power milling chuck

New power milling chuck



- Features, see page 26
- Straight collet DCS ,DC type, see page 74
- Taper collet(TC type), see page 75
- Spare part, see page76

C This symbol means optional through coolant system

26P 

74P 

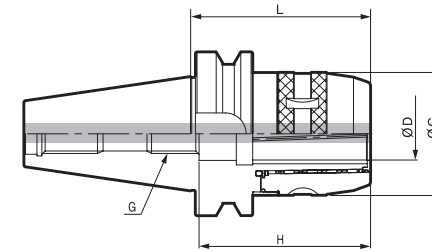
75P 

76P 

[illegible]

New power milling chuck set.

New power milling chuck set.



C This symbol means optional through coolant system

- HSK,SK / B set can be made by order

BT40, BT50	Designation	body	Collet	Spanner
	BT40-NPM32-110(A)	BT40-NPM32-110	DC32-6, 8, 10, 12, 16, 20, 25	75-79
	BT50-NPM32-110(A)	BT50-NPM32-110	DC32-6, 8, 10, 12, 16, 20, 25	75-79
	BT50-NPM42-110(A)	BT50-NPM42-110	DC42-6, 8, 10, 12, 16, 20, 25, 32	92-96

- MT and DJT collets are included in the B set.

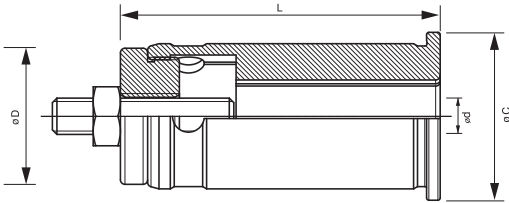


A Set



B Set

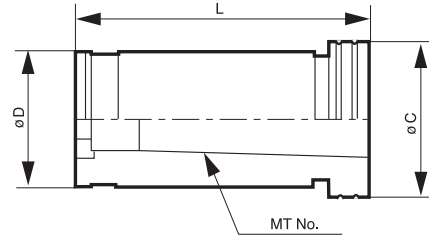
DCS
Straight collet



- Inch size is made by order.
- Length adjustment is available with adjust screw

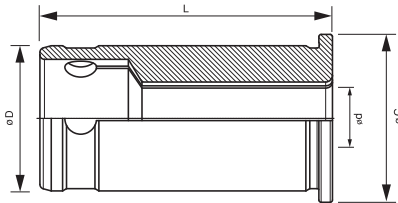
Designation	ØD	Ød	ØC	L	kg
DCS20- 6, 8, 10, 12, 16	20	6, 8, 10, 12, 16	26	55	0.2
DCS32- 6, 8, 10, 12, 14, 16, 19, 20, 25	32	6, 8, 10, 12, 14, 16, 19, 20, 25	38	70	0.4
DCS42- 6, 8, 10, 12, 16, 20, 25, 32	42	6, 8, 10, 12, 16, 20, 25, 32	48	75	0.7

TC
Taper collet



Designation	MT No.	ØD	ØC	L	Designation	MT No.	Ød	ØC	L
TC20-1	MT1	20	26	60	TC32-3	MT3	32	38	90
TC20-2	MT2	20	26	72	TC42-1	MT1	42	48	60
TC25-1	MT1	25	32	60	TC42-2	MT2	42	48	72
TC25-2	MT2	25	32	72	TC42-3	MT3	42	48	90
TC32-1	MT1	32	38	60	TC42-4	MT4	42	48	112.5
TC32-2	MT2	32	38	72					

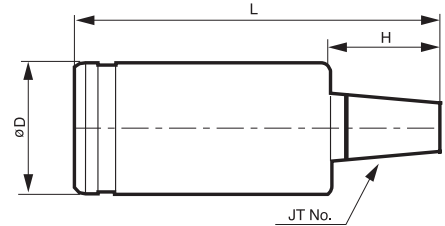
DC
Straight collet



- Inch size is made by order.

Designation	ØD	Ød	ØC	L	kg
DC20- 6, 8, 10, 12, 14, 16	20	6, 8, 10, 12, 14, 16	26	55	0.2
DC25- 6, 8, 10, 12, 16, 20	25	6, 8, 10, 12, 16, 20	29	61.5	0.3
DC32- 6, 8, 10, 12, 14, 16, 19, 20, 25	32	6, 8, 10, 12, 14, 16, 19, 20, 25	38	70	0.4
DC42- 6, 8, 10, 12, 16, 20, 25, 32	42	6, 8, 10, 12, 16, 20, 25, 32	48	75	0.7

DJT
Drill chuck arbor



Designation	JT No.	ØD	L	H
DJT20-6	JT6	30	83	28
DJT32-6	JT6	32	83	28
DJT42-6	JT6	42	83	28

New power milling chuck

Jet coolant disk



OPTIONAL (BT/SK)

Spare part

	Optional		
	Coolant system (BT/SK)	Collet	Spanner
			
NPM20	CTC20-20	DCS20, DC20	57-60
NPM32	CTC32-32	DCS32, DC32	75-79
NPM42	CTC42-42	DCS42, DC42	92-96

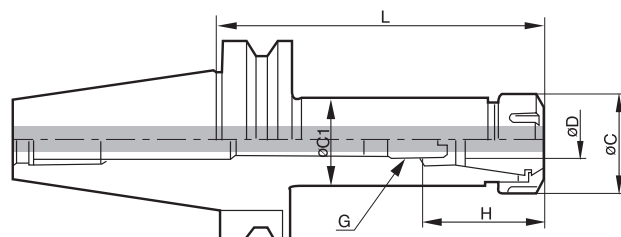
OPTIONAL (HSK)

Spare part

Optional	
Coolant type for through	
	
Shank	
HSK50	HSK50A-CNS
HSK63	HSK63A-CNS
HSK100	HSK100A-CNS

[illegible]

ER Collet chuck

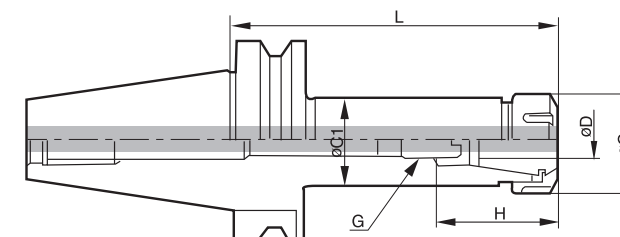


- Please use the exact size of collet for oil hole type.
- Ⓒ This symbol means optional through coolant system

- Features, see page 31 **31P** 
- Collet, see page 82 **82P** 
- Spare part, see page 84 **84P** 

[illegible]

ER Collet chuck



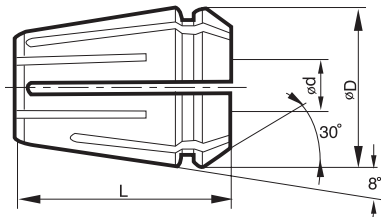
- Please use the exact size of collet for oil hole type.
- Ⓒ This symbol means optional through coolant system

- Features, see page 31 **31P**
- Collet, see page 82 **82P**
- Spare part, see page 84 **84P**

[illegible]

GERC COLLET

GERC Collet (Accuracy type , High accuracy type)



Designation	ER Size	ØD	L	Ød MAX.	Range	Accuracy type	Highaccuracy type (HP)
GERC11-Ød(HP)	11	11.5	18.0	7.0	0.5	5µm	2µm
GERC16-Ød(HP)	16	17.0	27.5	10.0	1.0	5µm	2µm
GERC20-Ød(HP)	20	21.0	31.5	13.0	1.0	5µm	2µm
GERC25-Ød(HP)	25	26.0	34.0	16.0	1.0	5µm	2µm
GERC32-Ød(HP)	32	33.0	40.0	20.0	1.0	5µm	2µm
GERC40-Ød(HP)	40	41.0	46.0	26.0	1.0	5µm	2µm

GERC COLLET SET

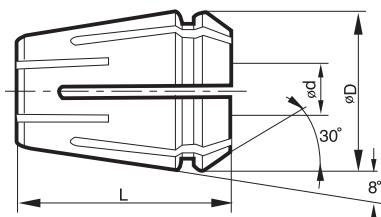
GERC Collet (Accuracy type)



Designation	Ød	Range	Quantity	High accuracy type
GERC11(SET)	1.0-7.0	0.5	13pcs	5µm
GERC16(SET)	1.0-10.0	1.0	10pcs	5µm
GERC20(SET)	2.0-13.0	1.0	12pcs	5µm
GERC25(SET)	2.0-16.0	1.0	15pcs	5µm
GERC32(SET)	3.0-20.0	1.0	18pcs	5µm
GERC40(SET)	4.0-26.0	1.0	23pcs	5µm

ER COLLET

ER Collet (Accuracy type , Through Coolant type)



Designation	ER Size	ØD	L	Ød Max.	Ø Min.	Range	High accuracy type
ER11-Ød	11	11.5	18.0	7.0	-	0.5	10µm
ER16-Ød(C)	16	17.0	27.5	10.0	4.0	1.0	10µm
ER20-Ød(C)	20	21.0	31.5	13.0	6.0	1.0	10µm
ER25-Ød(C)	25	26.0	34.0	16.0	6.0	1.0	10µm
ER32-Ød(C)	32	33.0	40.0	20.0	8.0	1.0	10µm

ER COLLET SET

ER Collet (Accuracy type)



Designation	Ød	Range	Quantity	High accuracy type
ER11(SET)	1.5-7.0	0.5	12pcs	10µm
ER16(SET)	2.0-10.0	1.0	10pcs	10µm
ER20(SET)	2.0-13.0	1.0	12pcs	10µm
ER32(SET)	3.0-20.0	1.0	18pcs	10µm

SDC SPARE PART

ER collet chuck spare part



BASIC

Spare part				
Chuck	Basic			
	Nut			Adjust screw
Type				
SDC7	R11	-	-	BN0716F
SDC10	R16	-	-	BN1025F
SDC13	-	RU20 - SDC13	-	BN1325F
SDC16	-	RU25 - SDC16	-	BN1830F
SDC20	-	RU32 - SDC20	-	BN2230F
SDC26	-	RU40 - SDC26	-	BN2838F
SDC34	-	RU50 - SDC34	-	BN3638F
SDC7S	-	-	R11M	BN0716F
SDC10S	-	-	R16M	BN1025F
SDC13S	-	-	R20M	BN1325F
SDC16S	-	-	R25M	BN1830F

OPTIONAL

Spare part				
Chuck	Optional			
	Spanner			GERC/ER
Type				
SDC7	S-17	-	-	GERC/ER 11-ØD
SDC10	S-25	-	-	GERC/ER 16-ØD
SDC13	-	35-38	-	GERC/ER 20-ØD
SDC16	-	42-46	-	GERC/ER 25-ØD
SDC20	-	48-52	-	GERC/ER 32-ØD
SDC26	-	62-65	-	GERC/ER 40-ØD
SDC34	-	75-79	-	GERC/ER 50-ØD
SDC7S	-	-	M11M	GERC/ER11-ØD
SDC10S	-	-	M16M	GERC/ER16-ØD
SDC13S	-	-	M20M	GERC/ER20-ØD
SDC16S	-	-	M25M	GERC/ER25-ØD

HPS SPARE PART

High speed ER collet chuck spare part



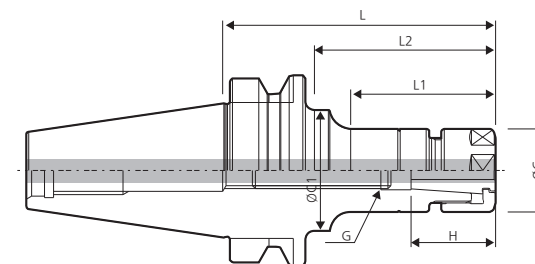
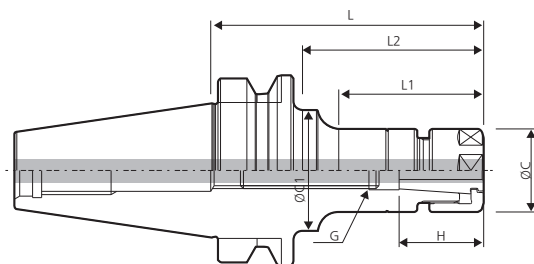
BASIC

Spare part		
Chuck	Basic	
	Sleeve bearing nut	Adjust screw
Type		
HPS7	RN11	BN0716F
HPS10	RN16	BN1025F
HPS13	RN20	BN1325F
HPS16	RN25	BN1830F
HPS20	RN32	BN2230F

OPTIONAL

Spare part		
Chuck	Optional	
	Spanner	GERC/ER
Type		
HPS7	20-22	GERC/ER 11-øD
HPS10	32-35	GERC/ER 16-øD
HPS13	35-38	GERC/ER 20-øD
HPS16	42-46	GERC/ER 25-øD
HPS20	48-52	GERC/ER 32-øD

Slim type collet chuck

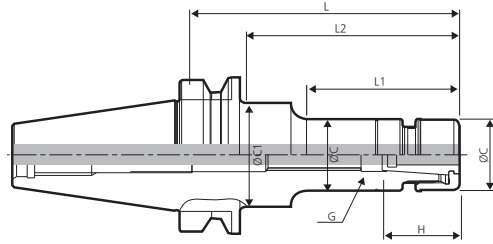


- Features, see page 34. **34P** 
- Collet, see page 90. **90P** 
- Spare part, see page 92. **92P** 

- Features, see page 34. 34P 
- Collet, see page 90. 90P 
- Spare part, see page 92. 92P 

[illegible][illegible]

Great speed slim type collet chuck



- Coolant system needs exclusive coolant collet
- Ⓒ This symbol means optional through coolant system

- Features, see page 33.
- Collet, see page 90.
- Spare part, see page 93.

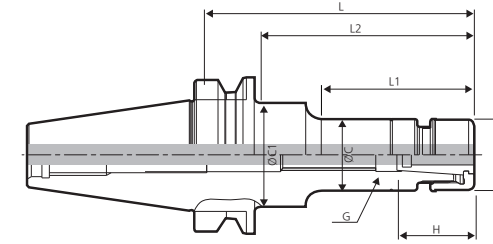
33P

90P

93P

[illegible]

Great speed slim type collet chuck



- Coolant system needs exclusive coolant collet
- Ⓒ This symbol means optional through coolant system

- Features, see page 33.
- Collet, see page 90.
- Spare part, see page 93.

33P ↗
90P ↗
93P ↗

[illegible]

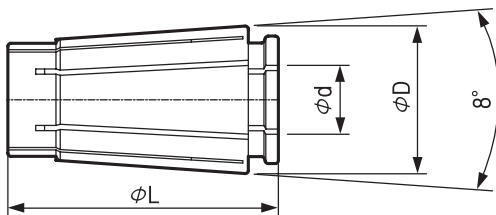
HC COLLET

HC Slim collet



HC COLLET

HC Slim collet



General & Accuracy type

Designation	ϕD	L	ϕd MAX.	Range	Accuracy type	High accuracy type(P)
HC6- ϕd (P)	10.5	25.0	6.0	1.0	5 μm	3 μm
HC10- ϕd (P)	15.6	30.5	10.0	1.0	5 μm	3 μm
HC13- ϕd (P)	20.1	39.0	13.0	1.0	5 μm	3 μm
HC16- ϕd (P)	24.6	45.0	16.0	1.0	5 μm	3 μm
HC20- ϕd (P)	29.2	54.3	20.0	1.0	5 μm	3 μm
HC25- ϕd (P)	35.7	57.0	25.0	1.0	5 μm	3 μm



HC6- ϕd	Clamping range
HC6-3.0	2.8-3.0
HC6-4.0	3.6-4.0
HC6-5.0	4.6-5.0
HC6-6.0	5.6-6.0

HC10- ϕd	Clamping range
HC10-2.0	1.75-2.0
HC10-3.0	2.8-3.0
HC10-4.0	3.6-4.0
HC10-5.0	4.6-5.0
HC10-6.0	5.6-6.0
HC10-7.0	6.6-7.0
HC10-8.0	7.6-8.0
HC10-9.0	8.6-9.0
HC10-10.0	9.6-10.0

HC13- ϕd	Clamping range
HC13-3.0	2.75-3.0
HC13-4.0	3.6-4.0
HC13-5.0	4.6-5.0
HC13-6.0	5.6-6.0
HC13-7.0	6.6-7.0
HC13-8.0	7.6-8.0
HC13-9.0	8.6-9.0
HC13-10.0	9.6-10.0
HC13-11.0	10.6-11.0
HC13-12.0	11.6-12.0
HC13-13.0	12.6-13.0

HC16- ϕd	Clamping range
HC16-3.0	2.75-3.0
HC16-4.0	3.6-4.0
HC16-5.0	4.6-5.0
HC16-6.0	5.6-6.0
HC16-7.0	6.6-7.0
HC16-8.0	7.6-8.0
HC16-9.0	8.6-9.0
HC16-10.0	9.6-10.0
HC16-11.0	10.6-11.0
HC16-12.0	11.6-12.0
HC16-13.0	12.6-13.0
HC16-14.0	13.6-14.0
HC16-15.0	14.6-15.0
HC16-16.0	15.6-16.0

HC20- ϕd	Clamping range
HC20-4.0	3.6-4.0
HC20-5.0	4.6-5.0
HC20-6.0	5.6-6.0
HC20-7.0	6.6-7.0
HC20-8.0	7.6-8.0
HC20-9.0	8.6-9.0
HC20-10.0	9.6-10.0
HC20-11.0	10.6-11.0
HC20-12.0	11.6-12.0
HC20-13.0	12.6-13.0
HC20-14.0	13.6-14.0
HC20-15.0	14.6-15.0
HC20-16.0	15.6-16.0
HC20-17.0	16.6-17.0
HC20-18.0	17.6-18.0
HC20-19.0	18.6-19.0
HC20-20.0	19.6-20.0

HC25- ϕd	Clamping range
HC25-8.0	7.6-8.0
HC25-9.0	8.6-9.0
HC25-10.0	9.6-10.0
HC25-11.0	10.6-11.0
HC25-12.0	11.6-12.0
HC25-13.0	12.6-13.0
HC25-14.0	13.6-14.0
HC25-15.0	14.6-15.0
HC25-16.0	15.6-16.0
HC25-17.0	16.6-17.0
HC25-18.0	17.6-18.0
HC25-19.0	18.6-19.0
HC25-20.0	19.6-20.0
HC25-21.0	20.6-21.0
HC25-22.0	21.6-22.0
HC25-23.0	22.6-23.0
HC25-24.0	23.6-24.0
HC25-25.0	24.6-25.0

DSK SPARE PART

Slim collet chuck spare part



BASIC

Spare part			
Type	Basic		
	Nut	Adjust screw	Collet ejector
			
DSK 6	DN 6	M820C	DSK-6CE
DSK 10	DN 10	M1230C	DSK-10CE
DSK 13	DN 13	BN1530F	DSK-13CE
DSK 16	DN 16	BN1830F	DSK-16CE
DSK 20	DN 20	BN2230F	DSK-20CE
DSK 25	DN 25	BN2838F	DSK-25CE

OPTIONAL

Spare part	
Type	Optional Spanner
	
DSK 6	DSS-6
DSK 10	DSS-10
DSK 13	DSS-13
DSK 16	DSS-16
DSK 20	DSS-20
DSK 25	DSS-25

GSK SPARE PART

Great speed slim type collet chuck



BASIC

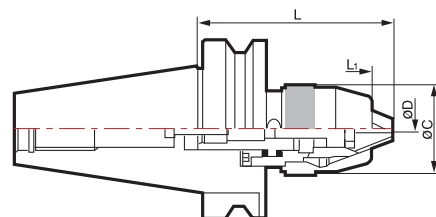
Spare part			
Type	Basic		
	Nut	Adjust screw	Collet ejector
			
GSK 6	GN 6	M820C	DSK-6CE
GSK 10	GN 10	M1230C	DSK-10CE
GSK 13	GN 13	BN1530F	DSK-13CE
GSK 16	GN 16	BN1830F	DSK-16CE
GSK 20	GN 20	BN2230F	DSK-20CE
GSK 25	GN 25	BN2838F	DSK-25CE

OPTIONAL

Spanner (optional)

Optional		
Designation	Type	
	GSK6	GSK6 SPANNER
	GSK10	GSK10 SPANNER
	GSK13	GSK13 SPANNER
	GSK16	GSK16 SPANNER
	GSK20	GSK20 SPANNER
	GSK25	GSK25 SPANNER

Drill chuck

95P

BT30, BT40, BT50

Drill chuck spare part

Spare part

Bolt

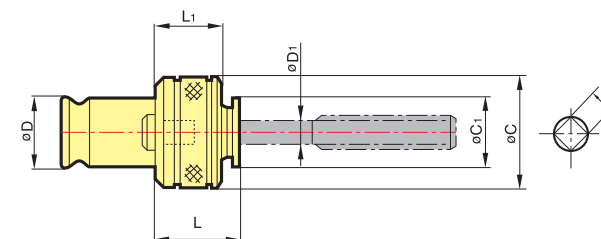
Spare part

Spanner

Tapping holder



Tap adapter

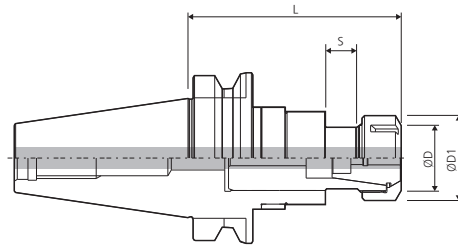
97P TCA1, TCA2, TCA3

※ DIN standard : Order to make

TCA1, TCA2, TCA3	Designation	ØD (Clamping range)	ØC	L	L1	kg
	TCA1-M3	4	3.2	24	22	0.2
	TCA1-M4	5	4	24	22	0.2
	TCA1-M5	5.5	4.5	24	22	0.2
	TCA1-M6, 1/4U	6	4.5	24	22	0.2
	TCA1-M8	6.2	5	25	22	0.2
	TCA1-M10, 3/8U	7	5.5	25	22	0.2
	TCA1-M11	8	6	39	22	0.2
	TCA1-M12	8.5	6.5	26	22	0.2
	TCA2-M8	6.2	5	38	28	0.6
	TCA2-M10	7	5.5	38	28	0.6
	TCA2-M12	8.5	6.5	39	28	0.6
	TCA2-M14, 3/4U	10.5	8	41	28	0.6
	TCA2-P1/4	11	9	31	28	0.6
	TCA2-M16	12.5	10	43	28	0.6
	TCA2-M18, P3/8	14	11	44	28	0.6
	TCA2-M20	15	12	45	28	0.6
	TCA2-M22	17	13	46	28	0.6
	TCA2-P1/2	18	14	36	28	0.6
	TCA2-M24	19	15	46	28	1.8
	TCA3-M16	12.5	10	35	37	1.8
	TCA3-M18	14	11	37	37	1.8
	TCA3-M20	15	12	37	37	1.8
	TCA3-M22	17	13	38	37	1.8
TCA3-M24	19	15	44	37	1.8	
TCA3-M27, 1U	20	15	62	37	1.8	
TCA3-M30, P3/4	23	17	62	37	1.8	
TCA3-M33	25	19	66	37	1.8	
TCA3-M36, M38	28	21	68	37	1.8	

High speed synchro tapping chuck

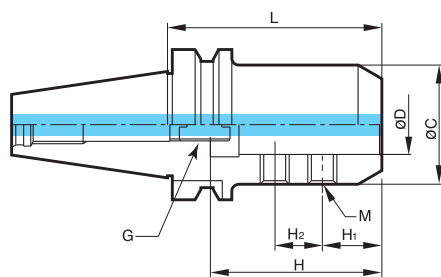
Tap ER collet



- Features, see page 37. **37P** 
- ER Collet, see page 82. **82P** 
- TER Collet, see page 99. **99P** 

TER16, TER20, TER25, TER32	Designation	Use tap	ØD	W	ØC	ØC1	L	L1	H
	TER16-4x3,2	M3	4	3.2	16.74	10.1	27.5	6.3	18
	TER16-5x4	M4	5	4	16.74	10.1	27.5	6.3	18
	TER16-5.5x4,5	M5	5.5	4.5	16.74	10.1	27.5	6.3	18
	TER16-6x4.5	M6,U1/4	6	4.5	16.74	10.1	27.5	6.3	18
	TER16-6.2x5	M7, M8	6.2	5	16.74	10.1	27.5	6.3	18
	TER16-7x5.5	M9, M10, U3/8	7	5.5	16.74	10.1	27.5	6.3	18
	TER20-5x4	M4	5	4	20.74	13.2	31.5	7.2	18
	TER20-5.5x4,5	M5	5.5	4.5	20.74	13.2	31.5	7.2	18
	TER20-6x4.5	M6,U1/4	6	4.5	20.74	13.2	31.5	7.2	18
	TER20-6.2x5	M7, M8	6.2	5	20.74	13.2	31.5	7.2	18
	TER20-7x5.5	M9, M10, U3/8	7	5.5	20.74	13.2	31.5	7.2	18
	TER20-8x6	M11, U7/16, P1/8	8	6	20.74	13.2	31.5	7.2	22
	TER20-8.5x6,5	M12	8.5	6.5	20.74	13.2	31.5	7.2	22
	TER25-5x4	M4	5	4	25.74	17.6	34	7.5	18
	TER25-5.5x4,5	M5	5.5	4.5	25.74	17.6	34	7.5	18
	TER25-6x4.5	M6	6	4.5	25.74	17.6	34	7.5	18
	TER25-6.2x5	M7, M8	6.2	5	25.74	17.6	34	7.5	18
	TER25-7x5.5	M9, M10, U3/8	7	5.5	25.74	17.6	34	7.5	18
	TER25-8.5x6,5	M12	8.5	6.5	25.74	17.6	34	7.5	22
	TER32-6x4.5	M6,U1/4	6	4.5	32.74	23.1	40	8.2	18
	TER32-6.2x5	M7, M8	6.2	5	32.74	23.1	40	8.2	18
	TER32-7x5.5	M9, M10, U3/8	7	5.5	32.74	23.1	40	8.2	18
	TER32-8X6	M11, U7/16, P1/8	8	6	32.74	23.1	40	8.2	22
	TER32-8.5x6,5	M12	8.5	6.5	32.74	23.1	40	8.2	22
	TER32-10.5x8	M14, U9/16	10.5	8	32.74	23.1	40	8.2	25
	TER32-12.5x10	M16	12.5	10	32.74	23.1	40	8.2	25
	TER32-14x11	M18, P3/8	14	11	32.74	23.1	40	8.2	25
	TER32-15x12	M20	15	12	32.74	23.1	40	8.2	25
	TER32-17x13	M22, U7/8	17	13	32.74	23.1	40	8.2	25
TER32-11x9	P1/4	11	9	32.74	23.1	40	8.2	25	
TER32-12x9	U5/8	12	9	32.74	23.1	40	8.2	25	
TER32-9x7	U1/2	9	7	32.74	23.1	40	8.2	22	

Side lock arbor



101P ↗

BT30, BT40, BT50

Side lock arbor spare part

Spare part

	Basic		
	Set screw		Adjust screw
Type			
	BT type	HSK / SK type	
SLA16	BTF1010	BTF1414 - 1.5	M1230C
SLA20	BTF1212-1.5	BTF1616 - 1.5	M1230C
SLA25	BTF1212-1.5	BTF1818 - 1.5	M1230C
SLA32	BTF1414-1.5	BTF2020 - 1.5	M1230C
SLA40	BTF1624-1.5	BTF2020 - 1.5	M1230C
SLA42	BTF1624-1.5	BTF2020 - 1.5	M1230C

Spare part

	Optional	
	Wrench	
Type		
	BT type	HSK / SK type
SLA16	LW - 5	LW - 6
SLA20	LW - 6	LW - 8
SLA25	LW - 6	LW - 8
SLA32	LW - 6	LW - 10
SLA40	LW - 8	LW - 10
SLA42	LW - 8	LW - 10

Face mill arbor

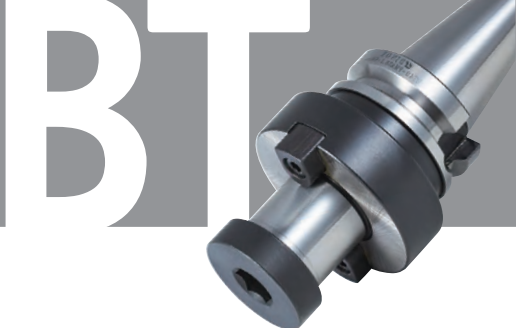


Fig. 1

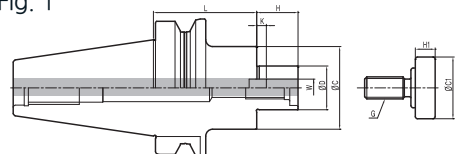


Fig. 2

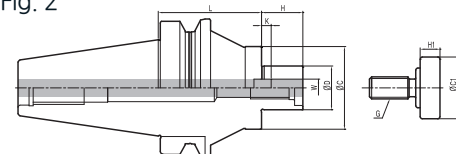


Fig. 3

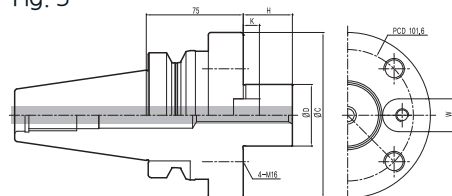
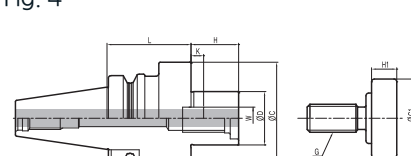


Fig. 4



C This symbol means optional through coolant system

- Spare part, see page 104. **104P** ➔
- Clamp bolt, see page 217. **217P** ➔

[illegible]

Face mill arbor



Fig. 1

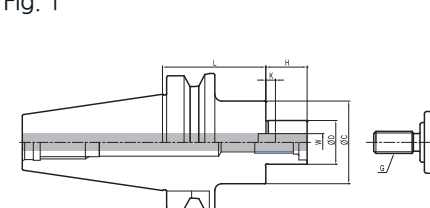


Fig. 2

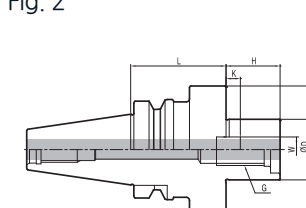
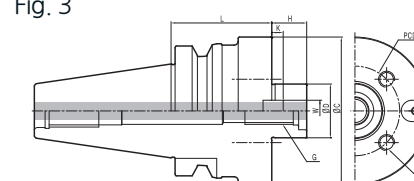


Fig. 3



C This symbol means optional through coolant system

- Clamp bolt, see page 217. **217P** ➔
- Spare part, see page 105. **105P** ➔

[illegible]

FMA,FMC SPARE PART

Face mill spare part



FMA,FMC SPARE PART

Face mill spare part



BASIC

FMA Spare part				
Type	Basic			
	Key	MBA bolt	Key bolt	Clamp bolt
				
FMA25.4	K9.5	MBA-M12	BX0412	BX1230
FMA31.75	K12.7	MBA-M16	BX0516	-
FMA38.1	K15.87	MBA-M20	BX0616	-
FMA50.8	K19.05	MBA-M24	BX0820	-
FMA47.625	K25.4	-	BX1020	BX1645

FMA Spare part	
Type	Optional Wrench
	
FMA25.4	LW-10
FMA31.75	LW-14
FMA38.1	LW-17
FMA50.8	LW-19
FMA47.625	-
S-FMA25.4	LW-10
S-FMA31.75	LW-14

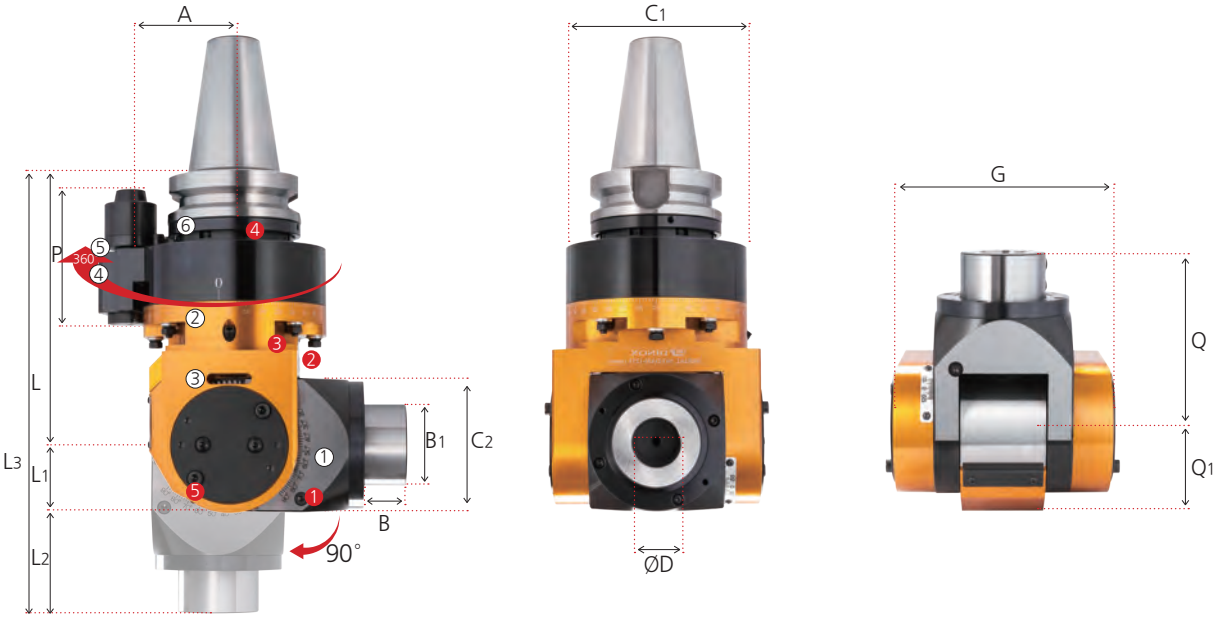
OPTIONAL

FMC Spare part				
Type	Basic			
	Key	MBA bolt	Key bolt	Clamp bolt
				
FMC16	K8.0	-	BX0310	BX0830
FMC22	K10.0	-	BX0412	BX1030
FMC27	K12.0	MBA - M12	BX0616	-
FMC32	K14.0	MBA - M16	BX0616	-
FMC40	K15.87	MBA - M20	BX0616	-

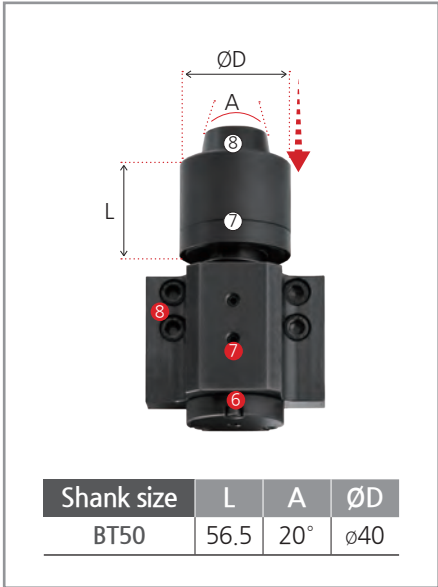
FMC Spare part	
Type	Optional Wrench
	
FMC16	LW - 6
FMC22	LW - 8
FMC27	LW - 10
FMC32	LW - 14
FMC40	LW - 17

BT-MAH

MAH for mold(0° - 90°)_Reinforced type(0° - 90°)



Positioning pin



NO	Name	
①	Inclination angle gradation (Axial positioning in 0°~90°)	
②	Rotating angle gradation (free radius position in 360°)	
③	Head	
④	Positioning pin part	
⑤	Jaw key	
⑥	Positioning ring	
⑦	Positioning pin cover	
⑧	Positioning pin	

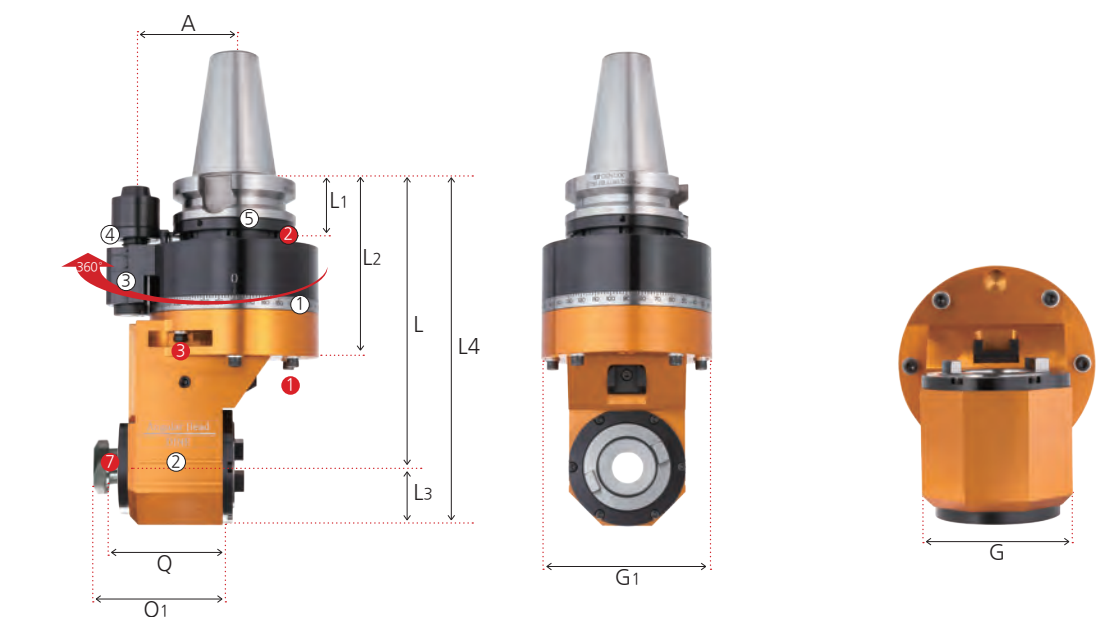
NO	Part name	Designation
①	Inclination angle gradation Screw	BT1216
②	Head fixed bolts	BT0645
③	Rotating angle gradation screw	BT0640
④	Positioning ring set screw	MSST5-12
⑤	Tilt axes fixing bolts	BH0616
⑥	Positioning pin height control bolt	BT0516
⑦	Positioning pin set screw	BT0512
⑧	Body position block set screw	BX0516

Designation	ØD	L	L1	L2	L3	C	C1	G	C2	Q	Q1	B	B1	P	A	MAX RPM	Install tool	kg
BT50-MAH32-200	32	200	47	78	325	136	95	154	95	125	63	31	60	95	80	3,000	SIDE LOCK	19

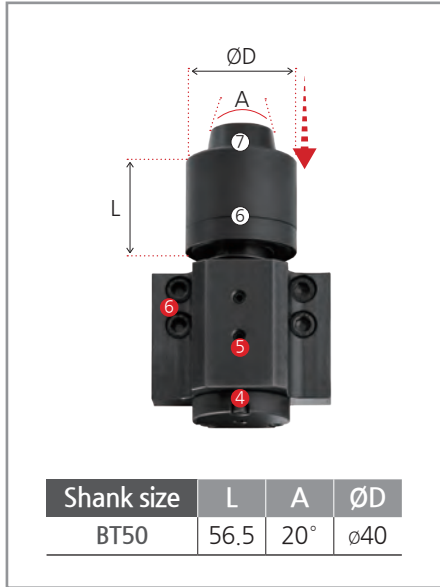
- Features, see page 40. 40P ➡
- Positioning block, see page 220. 220P ➡

BT-HRAG

HRAG(90° fixd)_Reinforced type(90° fixed)



Positioning pin



NO	Name	
①	Rotating angle gradation (free radius position in 360°)	
②	Head	
③	Positioning pin part	
④	Jaw key	
⑤	Positioning ring	
⑥	Positioning pin cover	
⑦	Positioning pin	

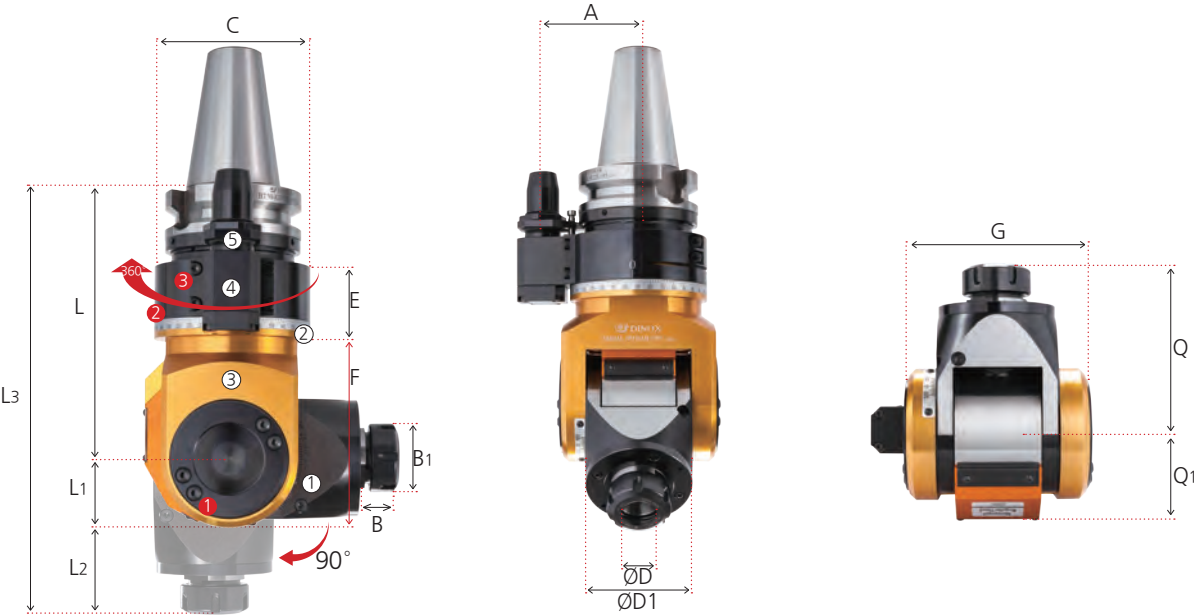
NO	Part name	Designation
①	Head fixed bolts	BX0660
②	Positioning ring set screw	MSST5-12
③	Rotating angle gradation screw	BT0648
④	Positioning pin height control bolt	BT0516
⑤	Positioning pin set screw	BT0512
⑥	Body position block set screw	BX0516
⑦	BT / NT bolt	

Designation	L	L1	L2	L3	L4	Q	Q1	A	G	G1	MAX RPM	Tool	kg
BT50-HRAG40-230	230	56.5	145	46.5	276.5	89	101	80	93	136	3,000	BT40/NT40	15.8

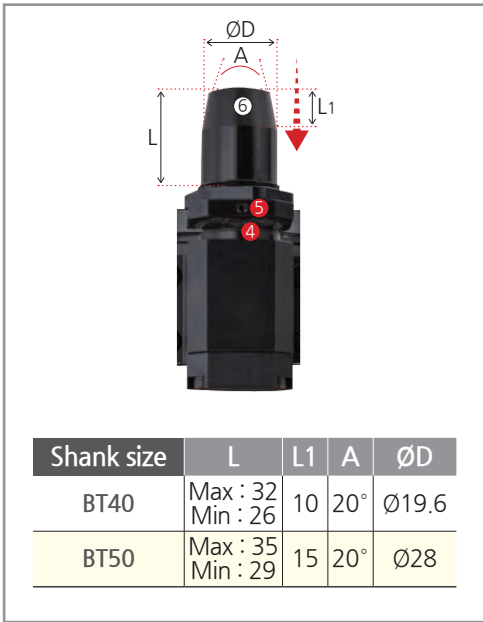
- Features, see page 41. 41P ➡
- Positioning block, see page 220. 220P ➡

BT-KHU

KHU(Free angle)_collet type(0° - 90°)



Positioning pin



Shank size	L	L1	A	ØD
BT40	Max : 32 Min : 26	10	20°	Ø19.6
BT50	Max : 35 Min : 29	15	20°	Ø28

NO	Name
①	Inclination angle gradation (Axial positioning in 0°~90°)
②	Rotating angle gradation (free radius position in 360°)
③	Head
④	Positioning pin part
⑤	Jaw key
⑥	Height control wrench hole

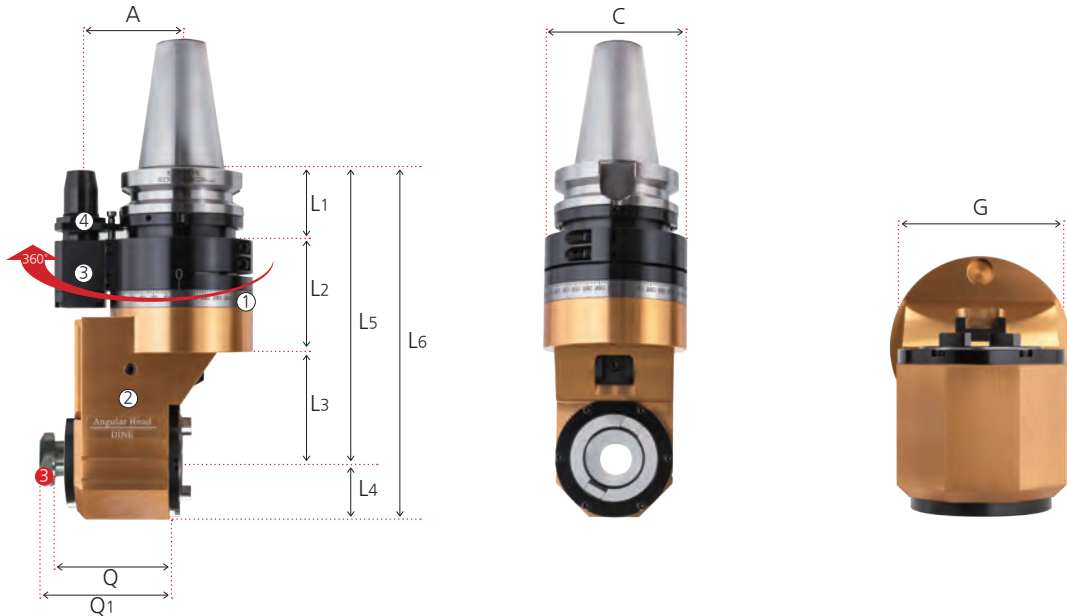
NO	Part name	Designation
①	Tilt Axes fixing bolts	BH0630
②	Bracket angle fixing bolt	BX0630
③	Position block fixing bolt	BX0512
④	Set screw	BT0404
⑤	Fixing bolts	BX05630

Designation	ØD (Clamping range)	ØD1	L	L1	L2	L3	B	B1	E	F	C	A	G	Q	Q1	Torque rate (IN:OUT)	Direction of rotation (IN:OUT)	MAX RPM	Collet	kg
BT40-KHU10-160	1.0~10.0	58	160	33	54	247	22	28	51	98	96	65	90	87	40	1:2	CW: CW	6,000	GERC16	6.4
BT50-KHU10-180	1.0~10.0	58	180	33	54	267	22	28	53	103	114	80	90	87	40	1:2	CW: CW	6,000	GERC16	10.5
BT50-KHU20-195	2.0~20.0	84	195	47	73	315	29	50	53	132	114	80	124	120	63	1:1	CW: CW	3,000	GERC32	15.8

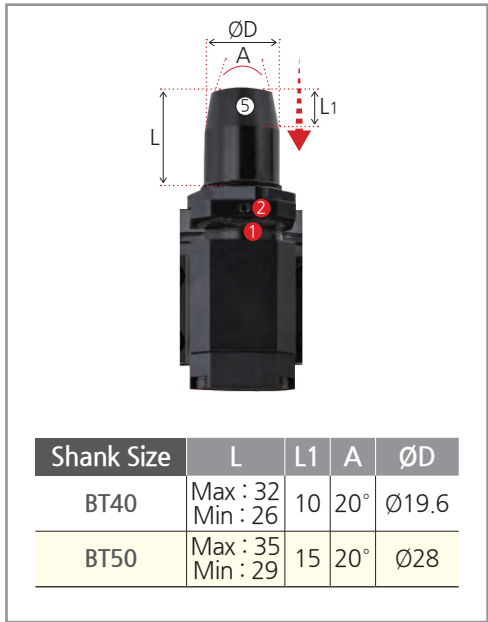
- Features, see page 40. 40P ➡
- Positioning block, see page 220. 220P ➡

BT-KAG

KAG(90° Fixed type)_Angular head(90° Fixed type)



Positioning pin



Shank Size	L	L1	A	ØD
BT40	Max : 32 Min : 26	10	20°	Ø19.6
BT50	Max : 35 Min : 29	15	20°	Ø28

NO	Name
①	Rotating angle gradation (free radius position in 360°)
②	Head
③	Positioning pin part
④	Jaw key
⑤	Height control wrench hole

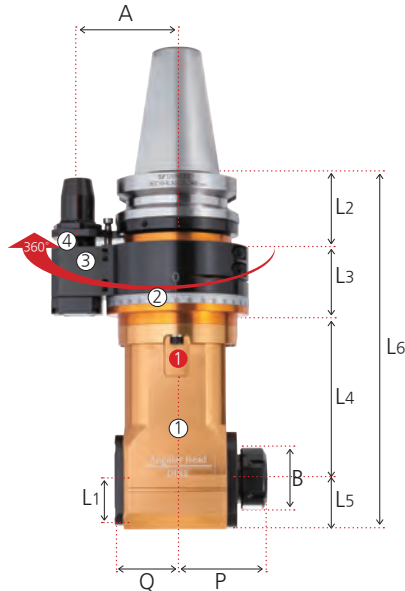
NO	Part name	Designation
①	Set screw	BT0404
②	Fixing bolts	BX50630
③	BT / NT bolt	

Designation	L1	L2	L3	L4	L5	L6	Q	Q1	A	C	G	Torque rate (IN:OUT)	Direction of rotation (IN:OUT)	MAX RPM	Shank	kg
BT40-KAG30-195	44	86	65	37.5	195	232.5	66	70	65	96	75	1:1	CW: CW	4,000	BT30/NT30	6.4
BT50-KAG40-230	57	88	85	46.5	230	276.5	89	94	80	114	93	1:1	CW: CW	3,000	BT40/NT40	10.5

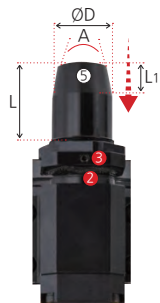
- Features, see page 41. 41P ➡
- Positioning Block, see page 220. 220P ➡

BT-KAH

HRAG(90° fixed)_Collet type (90° fixed)



Positioning pin



Shank size	L	L1	A	ØD
BT40	Max : 32 Min : 26	10	20°	Ø19.6
BT50	Max : 35 Min : 29	15	20°	Ø28

NO	Name
①	Head
②	Rotating angle graduation (free radius position in 360°)
③	Positioning pin part
④	Jaw key
⑤	Height control wrench hole

NO	Part name	Designation
①	Head fixing bolts	BX0618
②	Set screw	BT0404
③	Fixing bolts	BX50630

Designation	ØD	L	L1	L2	L3	L4	L5	L6	B	A	P	Q	G	G1	Torque rate (IN:OUT)	MAX RPM	Collet	kg
BT40-KAH7-170	1.0~7.0	170	20	44	71	55	20	190	19	65	37	24.5	40	96	1:1	5,000	GERC11	4.6
BT40-KAH10-195	1.0~10.0	195	25	44	71	80	25	220	28	65	46	32	58	96	1:1	5,000	GERC16	5.8
BT40-KAH13-165	1.0~13.0	165	28	44	71	50	28	193	35	65	53	35	60	96	1:1	5,000	GERC20	5.7
BT40-KAH20-180	2.0~20.0	180	38	44	71	65	38	218	50	65	71	49	76	96	1:1	3,500	GERC32	6.7
BT50-KAH07-220	1.0~7.0	220	20	57	54	109	20	240	19	80	37	24.5	40	96	1:1	5,000	GERC11	9.8
BT50-KAH10-215	1.0~10.0	215	25	57	54	104	25	240	28	80	46	32	58	96	1:1	5,000	GERC16	10.7
BT50-KAH10-260	1.0~10.0	260	25	57	54	149	25	285	28	80	46	32	58	96	1:1	5,000	GERC16	11
BT50-KAH13-260	1.0~13.0	260	28	57	54	149	28	288	35	80	53	35	60	96	1:1	5,000	GERC20	11.2
BT50-KAH20-200	2.0~20.0	200	38	57	54	89	38	238	50	80	71	49	76	96	1:1	3,500	GERC32	11.6
BT50-KAH20-240	2.0~20.0	240	38	57	54	129	38	278	50	80	71	49	76	96	1:1	3,500	GERC32	12.4

BT-KAC

KAC(45° fixed)_Collet type(45° fixed)



Positioning pin



Shank Size	L	L1	A	ØD
BT40	Max : 32 Min : 26	10	20°	Ø19.6
BT50	Max : 35 Min : 29	15	20°	Ø28

NO	Name
①	Head
②	Rotating angle graduation (free radius position in 360°)
③	Positioning pin part
④	Jaw key
⑤	Height control wrench hole

NO	Part name	Designation
①	Head fixing bolts	BX0618
②	Set screw	BT0404
③	Fixing bolts	BX50630

Designation	ØD (Clamping range)	L	L1	L2	L3	B	G	G1	P	Q	A	MAX RPM	Collet	kg
BT40-KAC10-220	1.0~10.0	220	44	71	105	28	60	96	25	54	65	5,000	GERC16	5.3
BT40-KAC13-220	1.0~13.0	220	44	71	105	28	60	96	25	54	65	5,000	GERC20	5.5
BT40-KAC20-230	2.0~20.0	230	44	71	115	50	72	96	30	60	65	3,500	GERC32	6.8
BT50-KAC10-240	1.0~10.0	240	57	54	129	28	60	96	25	54	80	5,000	GERC16	10.2
BT50-KAC13-240	1.0~13.0	240	57	54	129	28	60	96	25	54	80	5,000	GERC20	10.4
BT50-KAC20-250	2.0~20.0	250	57	54	139	50	72	96	30	60	80	3,500	GERC32	11.7

● Features, see page 40. 40P
● Positioning block, see page 220. 220P

● Features, see page 41. 41P
● Positioning block, see page 220. 220P

Modular arbor

MAS 403-BT	G6.3	C
Shank	G value	Coolant system



Fig. 1

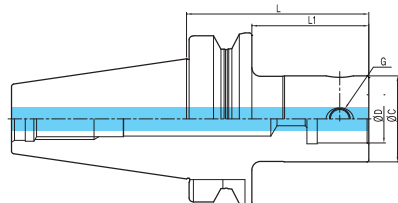
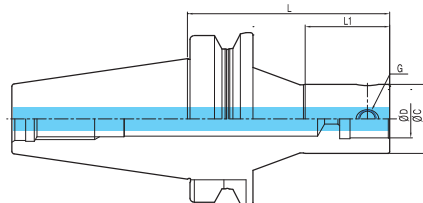


Fig. 2



 This symbol means built-in through coolant system

- Spare part, see page 115

115P [illegible]

Modular arbor

MAS 403-BT	G6.3	C
Shank	G value	Coolant system



Fig. 1

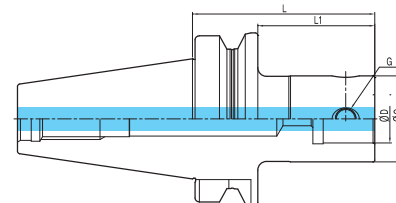
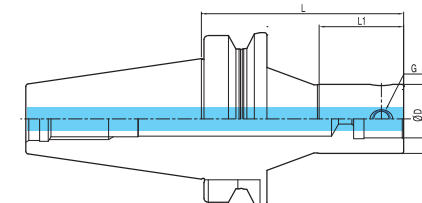


Fig. 2



C This symbol means built-in through coolant system

- Spare part, see page 115

115P ➤

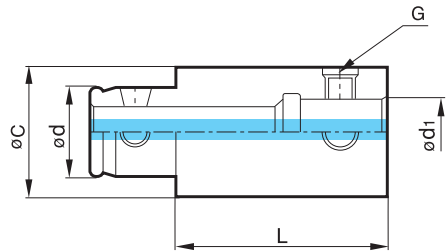
[illegible]

EXT

Extension bar



This symbol means built-in through coolant system



EXT

Designation	ØC	Ød	L	Ød1	G	kg
EXT1930F	19	11	30	11	M5	0.1
EXT1950F	19	11	50	11	M5	0.1
EXT2530F	25	14	30	14	M6	0.1
EXT2550F	25	14	50	14	M6	0.2
EXT3235F	32	18	35	18	M8	0.2
EXT3260F	32	18	60	18	M8	0.4
EXT4040F	40	22	40	22	M10	0.4
EXT4090F	40	22	90	22	M10	0.9
EXT5050F	50	28	50	28	M12	0.8
EXT50100F	50	28	100	28	M12	0.8
EXT6360F	63	36	60	36	M16	1.3
EXT63120F	63	36	60	36	M16	3
EXT8070F	80	45	70	45	M16	2.6
EXT80120F	80	45	120	45	M16	4.5
EXT9080F	90	45	80	45	M16	3.8
EXT90130F	90	45	130	45	M16	6.4

MD SPARE PART

BASIC

Spare part	
Type	Optional Taper screw
MD19F	BTT0506F
MD25F	BTT0608F
MD32F	BTT0810F
MD40F	BTT1013F
MD50F	BTT1215F
MD63F	BTT1620F
MD80F	BTT1626F
MD90F	BTT1631F

OPTIONAL

Spare part	
Type	Optional Wrench
MD19F	LW-2.5
MD25F	LW-3
MD32F	LW-4
MD40F	LW-5
MD50F	LW-6
MD63F	LW-8
MD80F	LW-8
MD90F	LW-8

OPTIONAL

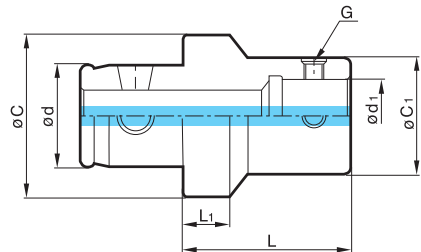
Spare part	
Optional Coolant type for through coolant system	
Shank type	
HSK50	HSK50A-CNS
HSK63	HSK63A-CNS
HSK100	HSK100A-CNS

RDC

Reducer bar



This symbol means built-in through coolant system



RDC

Designation	Ød	ØC1	Ød1	ØC	L	L1	G	kg
RDC3225F	18	25	14	32	30	9	M6	0.1
RDC4025F	22	25	14	40	30	9	M6	0.2
RDC4032F	22	32	18	40	30	9	M8	0.2
RDC5025F	28	25	14	50	30	9	M6	0.3
RDC5032F	28	32	18	50	40	9	M8	0.3
RDC5040F	28	40	22	50	30	10	M10	0.4
RDC6325F	36	25	14	63	30	9	M6	0.6
RDC6332F	36	32	18	63	40	9	M8	0.6
RDC6340F	36	40	22	63	45	10	M10	0.8
RDC6350F	36	50	28	63	30	10	M12	0.9
RDC8040F	45	40	22	80	40	10	M10	1.2
RDC8050F	45	50	28	80	45	10	M12	1.3
RDC8063F	45	63	36	80	50	13	M16	1.6

● Taper Screw, see page 216 216P

BT-FBH/B

Micro boring bar (balanced type)

BT

FBH/B SPARE PART

Micro boring bar (balanced type) spare part



Fig. 1

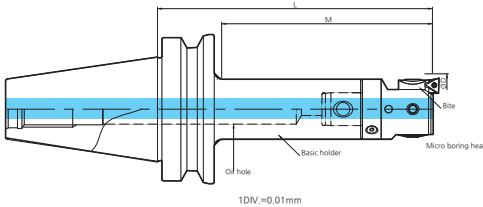
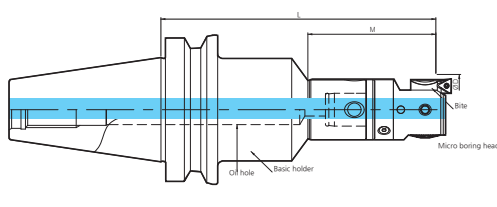


Fig. 2



C This symbol means built-in through coolant system

- Features, see page 42 **42P**
- Spare part, see page 117 **117P**

BT30, BT40, BT50	Designation			Boring range		L	Max. Boring head depth M	kg	Fig.
	Head designation	Bite designation	Body designation	min	max				
	FBH1920B	FBB20N-O-OO	BT30-MD19F-70	20(24)	26(30)	103	60	0.5	2
	FBH2526B	FBB26N-O-OO	BT30-MD25F-90	26(32)	34(40)	127	80	0.7	2
	FBH3233B	FBB33N-O-OO	BT30-MD32F-80	33(40)	43(50)	121	80	0.8	2
	FBH4042B	FBB42N-O-OO	BT30-MD40F-80	42(50)	54(62)	127	96	1.1	2
	FBH5053B	FBB53N-O-OO	BT30-MD50F-70	53(65)	70(82)	127	97	1.7	1
	FBH1920B	FBB20N-O-OO	BT40-MD19F-70	20(24)	26(30)	103	45	1.9	2
	FBH2526B	FBB26N-O-OO	BT40-MD25F-95	26(32)	34(40)	133	59	2	2
	FBH3233B	FBB33N-O-OO	BT40-MD32F-100	33(40)	43(50)	141	77	2.5	2
	FBH4042B	FBB42N-O-OO	BT40-MD40F-115	42(50)	54(62)	162	107	3.1	2
	FBH5053B	FBB53N-O-OO	BT40-MD50F-105	53(65)	70(82)	162	135	3.5	1
	FBH6368B	FBB68N-O-OO	BT40-MD63F-110	68(90)	100(122)	181	154	6.3	1
	FBH6398B	FBB68N-O-OO	BT40-MD63F-135	98(120)	150(172)	206	179	7.1	1
	FBH8098B	FBB68N-O-OO	BT40-MD80F-100	98(120)	150(172)	171	144	8.3	1
	FBH1920B	FBB20N-O-OO	BT50-MD19F-85	20(24)	26(30)	118	80	5.2	1
	FBH2526B	FBB26N-O-OO	BT50-MD25F-105	26(32)	34(40)	142	59	5.8	2
	FBH3233B	FBB33N-O-OO	BT50-MD32F-110	33(40)	43(50)	151	77	6	2
	FBH4042B	FBB42N-O-OO	BT50-MD40F-195	42(50)	54(62)	242	130	6.3	2
	FBH5053B	FBB53N-O-OO	BT50-MD50F-225	53(65)	70(82)	282	182	6.6	2
	FBH6368B	FBB68N-O-OO	BT50-MD63F-230	68(90)	100(122)	301	220	7.2	2
	FBH6398B	FBB68N-O-OO	BT50-MD63F-195	98(120)	150(172)	266	191	8.5	2
	FBH8098B	FBB68N-O-OO	BT50-MD80F-175	98(120)	150(172)	246	208	12.8	1

- Boring depth can be changed by variety of MD arboor and extension bar.
- Variety bites
FBBOON, FBBOON-1 : TPGT, TPGW0802OOL
FBBOON-O-C : CCMT,CCGT0602OOL
FBBOON-O-C09 : CCMT,CCGT09T3OOL
FBBOON-O-T11 : TPGT1103OOL

BASIC

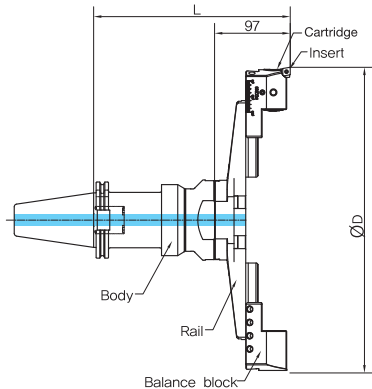
Spare part		
TYPE(FBH)	Lock screw	Clamp screw
FBH1920B	BTF0404	BXC0304
FBH2526B	BTF0505	BXC0405
FBH3233B	BTF0606	BXC0506
FBH4042B	BTF0808	BXC0610
FBH5053B	BTF0812	BXC0610
FBH6368B	BTF1016	BXC0810
FBH6398B	BTF1012	BXC0810
FBH8098B	BTF1014	BXC0810

OPTIONAL

Spare part			
Designation	Boring range	Insert screw	Clamp bolt
FBB15C	Ø15 ~ Ø18mm Ø18 ~ Ø22mm	BFTX01604N	BFTX02506N
FBB20N	Ø20 ~ Ø26mm	BFTX0204A	BXC0304
FBB20N-C		BFTX0204N	
FBB20N-1		BFTX0204A	
FBB20N-1-C	Ø24 ~ Ø30mm	BFTX0204N	BXC0405
FBB26N		BFTX0204A	
FBB26N-C		BFTX0204N	
FBB26N-1	Ø32 ~ Ø40mm	BFTX0204A	BXC0506
FBB26N-1-C		BFTX0204N	
FBB33N		BFTX0204A	
FBB33N-C	Ø41 ~ Ø50mm	BFTX02506N	BXC0610
FBB33N-1		BFTX0204A	
FBB33N-1-C		BFTX02506N	
FBB42N	Ø42~ Ø54mm	BFTX0204A	BXC0810
FBB42N-		BFTX02506N	
FBB42N-11		BFTX0307A	
FBB42N-1	Ø50~ Ø62mm	BFTX0204A	BXC0810
FBB42N-1-C		BFTX02506N	
FBB42N-1-T11		BFTX0307A	
FBB53N	Ø53~ Ø70mm	BFTX0204A	BXC0810
FBB53N-C		BFTX02506N	
FBB53N-11		BFTX0307A	
FBB53N-1	Ø65~ Ø82mm	BFTX0204A	BXC0810
FBB53N-1-C		BFTX02506N	
FBB53N-1-C09		BFTX0409N	
FBB53N-1-T11	Ø90~ Ø122mm Ø120~ Ø172mm	BFTX0307A	BXC0810
FBB68N		BFTX0204A	
FBB68N-C		BFTX0409N	
FBB68N-11	Ø90~ Ø122mm Ø120~ Ø172mm	BFTX0307A	BXC0810
FBB68N-1		BFTX0204A	
FBB68N-1-C09		BFTX0409N	
FBB68N-1-T11		BFTX0307A	

FBC/TBC

Balance cut tool for rough/fine boring



- Features, see page 43 43P
- Spare part, see page 119 119P

C This symbol means built-in through coolant system

BT50	Designation								Boring range	
	Body	kg	Rough boring(TBC)		kg	Fine boring(FBC)		L		
			TBC HEAD SET	L		FBC HEAD SET	L			
			(Rail+Cartridge)			(Rail+Cartridge+Balancing block)				
	BT50-FMD50-85	5.9	TBC130S(TBR130+BCC1348)	175	3.5	FBC130S(TBR130+FCC130+FCB130)	182	3.8	130	180
	BT50-FMD50-155	7.9	TBC130S(TBR130+BCC1348)	245	3.5	FBC130S(TBR130+FCC130+FCB130)	252	3.8	130	180
	BT50-FMD50-205	9.7	TBC130S(TBR130+BCC1348)	295	3.5	FBC130S(TBR130+FCC130+FCB130)	302	3.8	130	180
	BT50-FMD50-255	10.4	TBC130S(TBR130+BCC1348)	345	3.5	FBC130S(TBR130+FCC130+FCB130)	352	3.8	130	180
	BT50-FMD50-85	5.9	TBC175S(TBR175+BCC1348)	175	3.9	FBC175S(TBR175+FCC130+FCB130)	182	4.1	175	225
	BT50-FMD50-155	7.9	TBC175S(TBR175+BCC1348)	245	3.9	FBC175S(TBR175+FCC130+FCB130)	252	4.1	175	225
	BT50-FMD50-205	9.7	TBC175S(TBR175+BCC1348)	295	3.9	FBC175S(TBR175+FCC130+FCB130)	302	4.1	175	225
	BT50-FMD50-255	10.4	TBC175S(TBR175+BCC1348)	345	3.9	FBC175S(TBR175+FCC130+FCB130)	352	4.1	175	225
	BT50-FMD50-85	5.9	TBC220S(TBR220+BCC1348)	175	4.3	FBC220S(TBR220+FCC130+FCB130)	182	4.5	220	270
	BT50-FMD50-155	7.9	TBC220S(TBR220+BCC1348)	245	4.3	FBC220S(TBR220+FCC130+FCB130)	252	4.5	220	270
	BT50-FMD50-205	9.7	TBC220S(TBR220+BCC1348)	295	4.3	FBC220S(TBR220+FCC130+FCB130)	302	4.5	220	270
	BT50-FMD50-255	10.4	TBC220S(TBR220+BCC1348)	345	4.3	FBC220S(TBR220+FCC130+FCB130)	352	4.5	220	270
	BT50-FMD50-85	5.9	TBC265S(TBR265+BCC1348)	175	4.5	FBC265S(TBR265+FCC130+FCB130)	182	4.6	265	315
	BT50-FMD50-155	7.9	TBC265S(TBR265+BCC1348)	245	4.5	FBC265S(TBR265+FCC130+FCB130)	252	4.6	265	315
	BT50-FMD50-205	9.7	TBC265S(TBR265+BCC1348)	295	4.5	FBC265S(TBR265+FCC130+FCB130)	302	4.6	265	315
	BT50-FMD50-255	10.4	TBC265S(TBR265+BCC1348)	345	4.5	FBC265S(TBR265+FCC130+FCB130)	352	4.6	265	315
	BT50-FMD50-85	5.9	TBC310S(TBR310+BCC1354)	175	5.5	FBC310S(TBR310+FCC130+FCB130)	182	5.5	310	390
	BT50-FMD50-155	7.9	TBC310S(TBR310+BCC1354)	245	5.5	FBC310S(TBR310+FCC130+FCB130)	252	5.5	310	390
	BT50-FMD50-205	9.7	TBC310S(TBR310+BCC1354)	295	5.5	FBC310S(TBR310+FCC130+FCB130)	302	5.5	310	390
	BT50-FMD50-255	10.4	TBC310S(TBR310+BCC1354)	345	5.5	FBC310S(TBR310+FCC130+FCB130)	352	5.5	310	390
	BT50-FMD50-85	5.9	TBC385S(TBR385+BCC1354)	175	5.8	FBC385S(TBR385+FCC130+FCB130)	182	5.8	385	465
	BT50-FMD50-155	7.9	TBC385S(TBR385+BCC1354)	245	5.8	FBC385S(TBR385+FCC130+FCB130)	252	5.8	385	465
	BT50-FMD50-205	9.7	TBC385S(TBR385+BCC1354)	295	5.8	FBC385S(TBR385+FCC130+FCB130)	302	5.8	385	465
	BT50-FMD50-255	10.4	TBC385S(TBR385+BCC1354)	345	5.8	FBC385S(TBR385+FCC130+FCB130)	352	5.8	385	465
	BT50-FMD50-85	5.9	TBC460S(TBR460+BCC1354)	175	12.8	FBC460S(TBR460+FCC130+FCB130)	182	12.8	460	540
	BT50-FMD50-155	7.9	TBC460S(TBR460+BCC1354)	245	12.8	FBC460S(TBR460+FCC130+FCB130)	252	12.8	460	540
	BT50-FMD50-205	9.7	TBC460S(TBR460+BCC1354)	295	12.8	FBC460S(TBR460+FCC130+FCB130)	302	12.8	460	540
	BT50-FMD50-255	10.4	TBC460S(TBR460+BCC1354)	345	12.8	FBC460S(TBR460+FCC130+FCB130)	352	12.8	460	540

FBC/TBC SPARE PART

Balance cut tool for rough spare part

Spare part	Basic								
	Rail	Cartridge (Rough boring)	Cartridge (Fine boring)	Clamp bolt	Clamp bolt	Balancing block	Wrench	Clamp screw	Torx wrench
Head Set									
TBC130S	TBR130	BCC1348	-	BX0820	BT0645	-	LW-3	BFTX0511N	TW20
TBC175S	TBR175	BCC1348	-	BX0820	BT0645	-	LW-3	BFTX0511N	TW20
TBC220S	TBR220	BCC1348	-	BX0820	BT0645	-	LW-3	BFTX0511N	TW20
TBC265S	TBR265	BCC1348	-	BX0820	BT0645	-	LW-3	BFTX0511N	TW20
TBC310S	TBR310	BCC1354	-	BX0820	BT0660	-	LW-3	BFTX0511N	TW20
TBC385S	TBR385	BCC1354	-	BX0820	BT0660	-	LW-3	BFTX0511N	TW20
TBC460S	TBR460	BCC1354	-	BX0820	BT0660	-	LW-3	BFTX0511N	TW20
FBC130S	TBR130	-	FCC130	BX0820	BT0645	FCB130	LW-3	-	-
FBC175S	TBR175	-	FCC130	BX0820	BT0645	FCB130	LW-3	-	-
FBC220S	TBR220	-	FCC130	BX0820	BT0645	FCB130	LW-3	-	-
FBC265S	TBR265	-	FCC130	BX0820	BT0645	FCB130	LW-3	-	-
FBC310S	TBR310	-	FCC310	BX0820	BT0660	FCB310	LW-3	-	-
FBC385S	TBR385	-	FCC310	BX0820	BT0660	FCB310	LW-3	-	-
FBC460S	TBR460	-	FCC310	BX0820	BT0660	FCB310	LW-3	-	-

FBB

FBB Bite (Use FBC)



Designation	Insert
FBB130-C09	CCMT09T300, CCGT09T300
FBB130-C12	CCMT120400
FBB130-T11	TPMT110300, TPGT110300

BT

BT-DBC

Balance cut tool(Modular type)

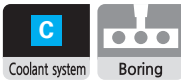


Fig. 1

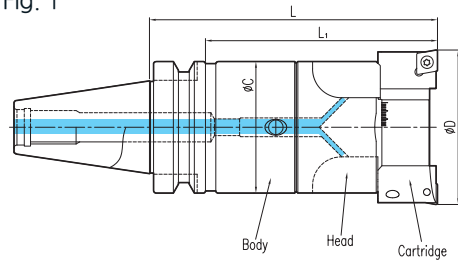
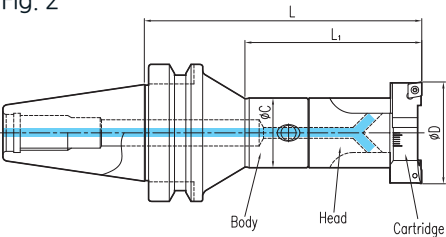


Fig. 2



- Boring depth can be changed by variety of MD arbor and extension bar.
- C This symbol means built-in through coolant system

- MD Arbor, see page 112 112P
- Spare part, see page 121 121P

BT30, BT40, BT50	Designation				Boring range		L	Max. Boring depth M	Fig.
	Head Set, designation	kg	Body designation	kg	min	max			
	DBC2528S	0.3	BT30-MD25F-90	0.4	28	35	150	93	2
	DBC3235S	0.4	BT30-MD32F-80	0.4	35	46	145	114	2
	DBC4046S	0.6	BT30-MD40F-80	0.5	46	58	150	119	2
	DBC5058S	1.1	BT30-MD50F-70	0.8	58	74	150	128	1
	DBC2528S	0.3	BT40-MD25F-105R	1.9	28	35	165	100	2
	DBC3235S	0.4	BT40-MD32F-115R	2.4	35	46	180	110	2
	DBC4046S	0.6	BT40-MD40F-110R	2.7	46	58	180	130	2
	DBC5058S	1.1	BT40-MD50F-105	2.7	58	74	185	130	1
	DBC6374S	2.0	BT40-MD63F-110	3.6	74	94	200	150	2
	DBC8094S	3.5	BT40-MD80F-100	4.8	94	120	200	173	2
	DBC2528S	0.3	BT50-MD25F-120R	4.7	28	35	180	100	2
	DBC3235S	0.4	BT50-MD32F-235R	5.3	35	46	300	180	2
	DBC4046S	0.6	BT50-MD40F-230R	5.6	46	58	300	250	2
	DBC5058S	1.1	BT50-MD50F-250R	6.5	58	74	330	280	2
	DBC6374S	2.0	BT50-MD63F-230	8.4	74	94	320	280	2
	DBC8094S	3.5	BT50-MD80F-175	9.5	94	120	275	225	1
	DBC120S	5.3	BT50-MD80F-175	9.5	120	175	275	235	1

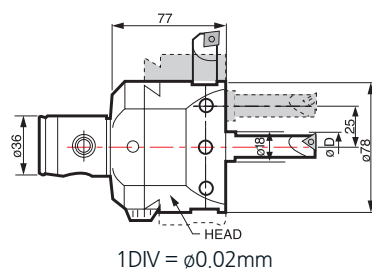
DBC SPARE PART

Balance cut tool(Modular type) spare part

BASIC

	Spare part								
	Head	Spring pin	Wrench bolt	Wrench	Cartridge	SET screw	Wrench	Clamp screw	Torx wrench
Head set									
DBC2528S	DBC2528	SP0308	BX0415	LW-3	BCC28	BT0306	LW-1.5	FTKA02565	TRX7
DBC3235S	DBC3235	SP0410	BX0515	LW-4	BCC35	BT0308	LW-1.5	FTKA02565	TRX7
DBC4046S	DBC4046	SP0516	BX0620	LW-5	BCC46	BT0410	LW-2	FTNA0408	TRX15
DBC5058S	DBC5058	SP0616	BX0620	LW-5	BCC58	BT0412	LW-2	FTNA0408	TRX15
DBC6374S	DBC6374	SP1018	BX0830	LW-6	BCC74	BT0516	LW-2.5	BFTX0511N	TRX20
DBC8094S	DBC8094	SP1020	BX1035	LW-8	BCC94	BT0620	LW-3	BFTX0511N	TRX20
DBC120S	DBC120N	SP1020	BX0830	LW-6.0	BCC120	BT0830	LW-4	BFTX0511N	TRX20

Micro boring

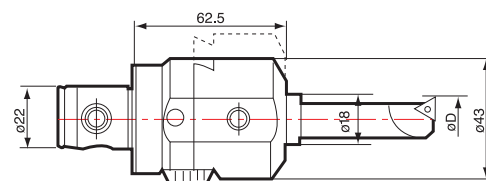


1DIV = $\varnothing 0.02\text{mm}$

 This symbol means unavailable with through coolant system

- Boring range, see page 124 **124P** 
- Spare part, see page 125 **125P** 

Small micro boring bar

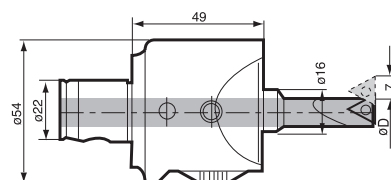


1DIV = $\varnothing 0,02\text{mm}$

 This symbol means unavailable with through coolant system

- Boring range, see page 124
- Spare part, see page 125

Small micro boring bar



1DIV = $\varnothing 0.01\text{mm}$

C This symbol means optional through coolant system

- Boring range, see page 124 **124P** 
- Spare part, see page 125 **125P** 

Boring head	Bite	MD NO.	L (Head length)	kg
SMH4022	BB16-O(S)	BTOO-MD40F	49	0.7

Small micro boring Set.



SET NUMBER

[illegible]

BB BITE

BB Bite(SMB, SMH, KMB)

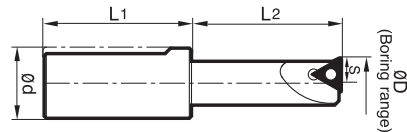


KMB SPARE PART

Micro boring spare part

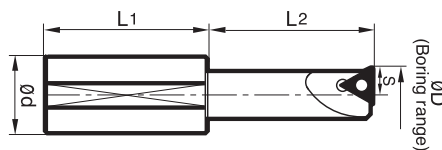


Boring bite : BB type(for KMB)



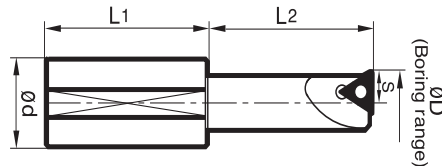
Designation	Boring range(Center)		Boring range(Side)		S	L1	L2	Insert	Insertscrew
	min	max	min	max					
BB18-7(S)	7	40	43	91	3.5	30	30	TBGT0601OOL	BFTX0204A
BB18-9(S)	9	42	45	93	4.5	30	40	TBGT0802OOL	BFTX0204A
BB18-11(S)	11	44	47	95	5.5	30	45	TPGT1103OOL	BFTX0307A
BB18-13(S)	13	46	49	97	6.5	40	45	TPGT1103OOL	BFTX0307A
BB18-15(S)	15	48	51	99	7.5	40	50	TPGT1103OOL	BFTX0307A
BB18-17(S)	17	50	53	101	8.5	40	50	TPGT1103OOL	BFTX0307A

Boring bite : BB type(for SMB)



Designation	Boring range		S	L1	L2	Insert	Insertscrew
	min	max					
BB18-7(S)	7	27	3.5	30	30	TBGT0601OOL	BFTX0204A
BB18-9(S)	9	29	4.5	30	40	TBGT0802OOL	BFTX0204A
BB18-11(S)	11	31	5.5	30	45	TPGT1103OOL	BFTX0307A
BB18-13(S)	13	33	6.5	40	45	TPGT1103OOL	BFTX0307A
BB18-15(S)	15	35	7.5	40	50	TPGT1103OOL	BFTX0307A
BB18-17(S)	17	37	8.5	40	50	TPGT1103OOL	BFTX0307A

Boring bite : BB type(for SMH)



Designation	Boring range		S	L1	L2	Insert	Insert screw	Wrench
	min	max						
BB16-5(S)	5.5	19	2.75	34	20	WBGT0601OOL	BFTX0203A	TRX06
BB16-7(S)	7	21	3.5	34	30	TBGT0601OOL	BFTX0204A	TRX06
BB16-9(S)	9	23	4.5	34	40	TPGT0802OOL	BFTX0204A	TRX06
BB16-11(S)	11	25	5.5	34	45	TPGT1103OOL	BFTX0307A	TRX10
BB16-15(S)	15	29	7.5	34	50	TPGT1604OOL	BFTX0307A	TRX10
BB16-19(S)	19	33	9.5	34	60	TPGT1103OOL	BFTX0410A	TRX15

Spare part	Basic			Optional	
	Boring head	Taper screw	Wrench	Boring bite	MD arbor
Type					
KMB	KMB6336	BTT1620F	LW-8	BB18	MD63F

SMB SPARE PART

Small micro boring bar spare part



Spare part	Basic			Optional	
	Boring head	Taper screw	Wrench	Boring bite	MD arbor
Type					
SMB	SMB4022	BTT1013F	LW-5	BB18	MD40F

SMH SPARE PART

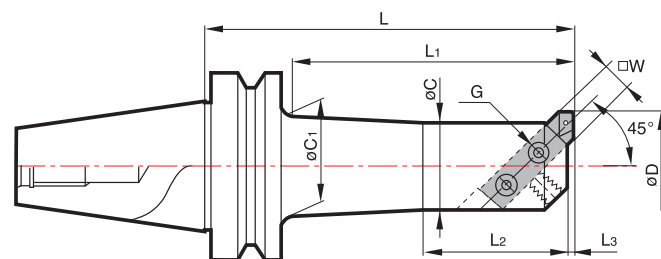
Small micro boring bar spare part



Spare part	Basic			Optional	
	Boring head	Taper screw	Wrench	Boring bite	MD arbor
Type					
SMH	SMH4022	BTT1013F	LW-5	BB16	MD40F

BT
S(T)
HSK
SK
NT
CBN/PCD
OTHER

Square boring bar



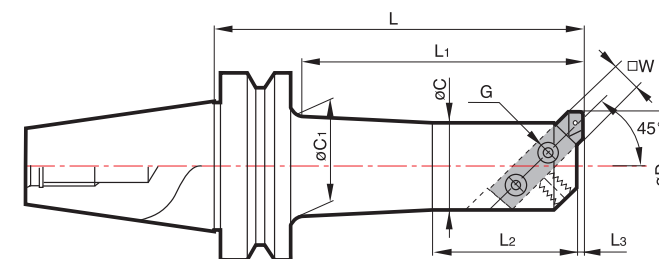
- Bite is option.

- Spare part, see page 128

128P ↗

[illegible]

Square boring bar



- Bite is option.

- Spare part, see page 128

128P [illegible]

BSA SPARE PART

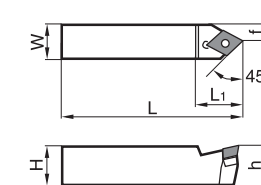
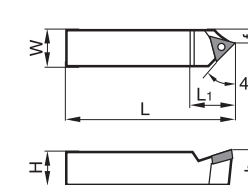
Boring bar spare part

BH

Square boring bite for BSA



BH400 series for BSA



BASIC

Spare part

	Basic
	SET screw
Type	
BSA25	BTF0606
BSA30	BTF0606
BSA38	BTF0808
BSA42	BTF0808
BSA50	BTF1012
BSA62	BTF1016
BSA72	BTF1216
BSA90	BTF1220
BSA105	BTF1220

OPTIONAL

Spare part

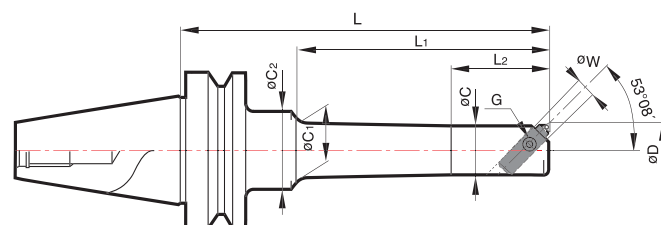
	Optional	
	Bite	Wrench
Type		
BSA25	BH408	LW-3
BSA30	BH408	LW-4
BSA38	BH410	LW-4
BSA42	BH410	LW-5
BSA50	BH413	LW-5
BSA62	BH416	LW-5
BSA72	BH419	LW-5
BSA90	BH419	LW-6
BSA105	BH425	LW-6

Optional

Wrench

[illegible]

FZ Micro boring bar



1DIV. = $\varnothing 0.02\text{mm}$

※ Please refer to FZ unit spec. table.

 This symbol means unavailable with through coolant system

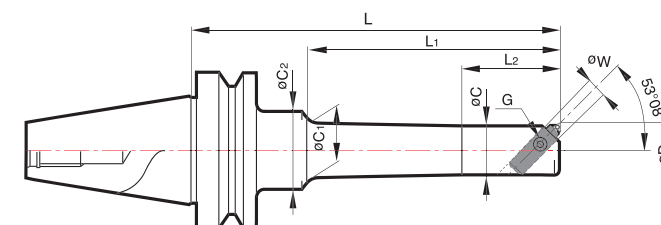
- Boring unit is option

- Unit, see page 133

133P ↗

BT-BKA

FZ Micro boring bar



1DIV. = $\varnothing 0.02\text{mm}$

※ Please refer to FZ unit spec. table.

C This symbol means unavailable with through coolant system

- Boring unit is option

- Unit, see page 133

133P 7

[illegible]

FZ Micro boring spare part

FZ Unit Inclined mounting type

BASIC

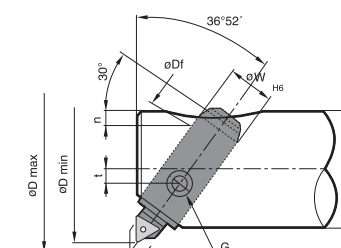
Spare part

Chuck	BASIC
	SET screw
Type	
BAK23	BTF0606
BAK28	BTF0606
BAK36	BTF0808
BAK45	BTF1010
BAK56	BTF1212
BAK72	BTF1616
BAK90	BTF2020
BAK110	BTF2020

OPTIONAL

Spare part

Chuck	Optional		
	Unit		Wrench
Type			
BKA23	FZ 8-23-3(P100, K10)		LW-3
BKA28	FZ10-28-3(S)	FZ10-32-3(S)	LW-3
BKA36	FZ12-36-3(S)	FZ12-40-3(S)	LW-4
BKA45	FZ16-45-3(S)	FZ16-50-3(S)	LW-5
BKA56	FZ20-56-3(S)	FZ20-64-3(S)	LW-4
BKA72	FZ25-72-3(S)	FZ25-80-3(S)	LW-8
BKA90	FZ32-90-3(S)	FZ32-100-3(S)	LW-10
BKA110	FZ32-110-3(S)	FZ32-125-3(S)	LW-10



※ Adjustable range : Ø0.02mm / 1 scale

● Insert, see page 135

135P 

C This symbol means unavailable with through coolant system

[illegible]

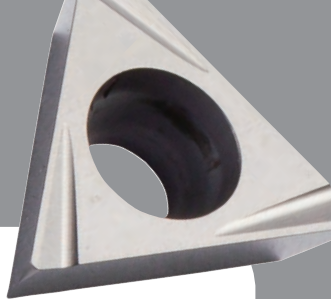
FZ UNIT SPARE PART

FZ Unit spare part



INSERT

FZ Unit, FF Unit



BASIC

Spare part			
Chuck	Basic		
	Housing	Spindle	Insert screw
Type			
FZ8-23, 26-3, P10	8-23, 26-3	8Z3(P10)	-
FZ8-23, 26-3, K10	8-23, 26-3	8Z3(P10)	-
FZ10-28, 32-3(S)	10-28, 32-3	U10Z3(S)	BFTX0204A
FZ12-36, 40-3(S)	12-36, 40-3	U12Z3(S)	BFTX0204A
FZ16-45, 50-3(S)	16-45, 50-3	U16Z3(S)	BFTX0204A
FZ20-56, 64-3(S)	20-56, 64-3	U20Z3(S)	BFTX0204A
FZ25-72, 80-3(S)	25-72, 80-3	U25Z3(S)	BFTX0307A
FZ32-90, 100, 110, 125-3(S)	32-90, 100-3	U32Z3(S)	BFTX0307A

Optional

Spare part			
Chuck	Optional		
	Torx wrench	L- wrench	Torx wrench
Type			
FZ8-23, 26-3, P10	-	LW-1.5	R0/N0
FZ8-23, 26-3, K10	-	LW-1.5	R0/N0
FZ10-28, 32-3(S)	TW06	LW-2	R2/N1
FZ12-36, 40-3(S)	TW06	LW-2.5	R2A/N2
FZ16-45, 50-3(S)	TW06	LW-3	N3
FZ20-56, 64-3(S)	TW06	LW-3	R4/N4
FZ25-72, 80-3(S)	TW10	LW-4	ZV25
FZ32-90, 100, 110, 125-3(S)	TW10	LW-5	R5/N5

Fig. 1 (With chip breaker)

Fig. 2 (Without chip breaker)

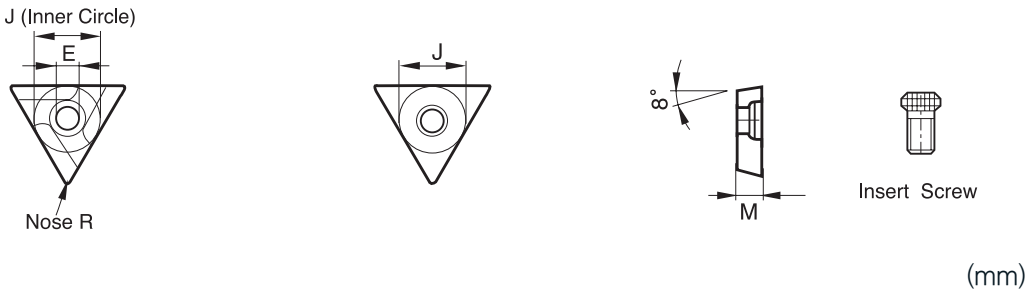


Fig.	Grade of Insert	Workpiece
1	K10(W.C)	Cast iron, Aluminum
1	P10(W.C)	Steel, Stainless steel
1	CN1000 or CN2000(Cermet)	Steel
2	K10(W.C)	Exclusive for Cast Iron

General inserts complying with ISO standard

Insert	Fig.	J	R	M	E	Insert screw	Wrench
TBGT0601〇〇L	1	3.97	0.2	1.59	2.2	BFTX0204A	TW06
TPGT0802〇〇L	1	4.76	0.2	2.38	2.4	BFTX0204A	TW06
TPGT1103〇〇L	1	6.35	0.4	3.18	2.8	BFTX0207A	TW10



Grade of Insert

- Coated : PC8110, PC9030 : Stainless steel, heat treatment steel
- W.C : G10E : Cast-iron
- Cermet : CN2000, CC115(Korloy)

Micro boring bar



Fig. 1

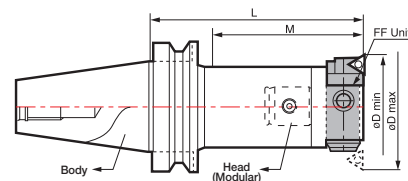
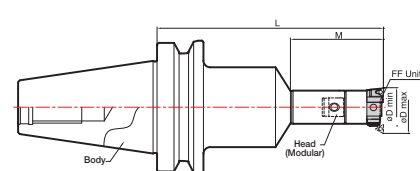


Fig. 2



1 DIV. = 0.02mm

- Boring unit is option.
- Insert, see page 138
- Spare part, see page 112

138P 

112P ↗

 This symbol means unavailable with through coolant system

Designation		Boring range		kg	Basic holder	L	kg	Boring depth	Fig.
Head	Boring unit	MIn	MAX						
BCF2530	FF10-30(S)	29.5	42	0.3	BT30-MD25F-90R	140	0.4	93	2
BCF3239	FF12-39(S)	39	50	0.4	BT30-MD32F-80R	140	0.4	99	2
BCF4047	FF16-47(S)	47	66	0.6	BT30-MD40F-110R	170	0.8	109	2
BCF5058	FF20-58(S)	58	83	1	BT30-MD50F-55	125	0.7	98	1
BCF2530	FF10-30(S)	29.5	42	0.3	BT40-MD25F-95R	145	1.9	72	2
BCF3239	FF12-39(S)	39	50	0.4	BT40-MD32F-100R	160	2.3	96	2
BCF4047	FF16-47(S)	47	66	0.6	BT40-MD40F-115R	175	2.7	120	2
BCF5058	FF20-58(S)	58	83	1	BT40-MD50F-105	175	2.7	143	1
BCF6379	FF25-79(S)	79	108	1.3	BT40-MD63F-110	180	4.6	148	1
BCF100	FF32-100(S)	100	141	1.4	BT40-MD80F-100	200	4.8	168	1
BCF2530	FF10-30(S)	29.5	42	0.3	BT50-MD25F-105R	155	4.5	72	2
BCF3239	FF12-39(S)	39	50	0.4	BT50-MD32F-110R	170	5.1	96	2
BCF4047	FF16-47(S)	47	66	0.6	BT50-MD40F-195	255	5.4	143	2
BCF5058	FF20-58(S)	58	83	1	BT50-MD50F-225R	295	6.4	195	2
BCF6379	FF25-79(S)	79	108	1.3	BT50-MD63F-195R	265	8	222	2
BCF100	FF32-100(S)	100	141	1.4	BT50-MD80F-175	275	9.5	232	1

[illegible]

Micro boring bar



Fig. 1

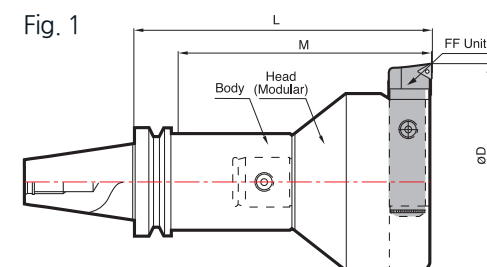
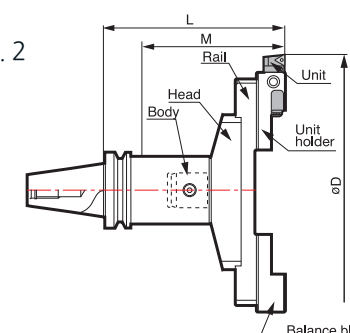


Fig. 2



1DIV. = 0.02mm

- Boring unit is option.
- Insert, see page 138
- Spare part, see page 112

138P 112P 

C This symbol means unavailable with through coolant system

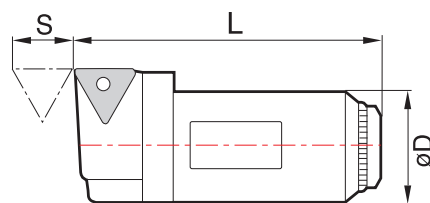
Designation		Boring range		Head length	kg	MD NO.	Fig.
Head	Boring unit	MIn	MAX				
BCF138	FF32-138(S)	138	159	100	5.1	BT50-MD90F-OOO	1
BCF150	FF32-138(S)	150	171	100	5.4	BT50-MD90F-OOO	1
BCF170	FF32-138(S)	170	191	100	5.7	BT50-MD90F-OOO	1
BCF190	FF32-138(S)	190	211	100	6	BT50-MD90F-OOO	1
BCF210	FF32-138(S)	210	231	100	6.4	BT50-MD90F-OOO	1
BCF230	FF32-138(S)	230	251	100	8.5	BT50-MD90F-OOO	1
BCF250FS	FF25-79(S)	250	355	107	9.2	BT50-MD90F-OOO	2
BCF350FS	FF25-79(S)	355	450	107	10.2	BT50-MD90F-OOO	2

[illegible]



FF UNIT SPARE PART

FF Unit spare



 This symbol means unavailable with through coolant system

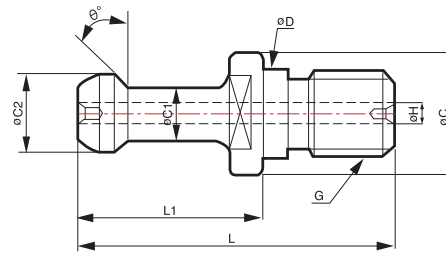
[illegible]

BASIC

Spare part

	Basic		
	Clamp screw	Torx wrench	Wrench
Type			
FF10-30(S)	BFTX0204A	TRX06	LW-2
FF12-39(S)	BFTX0204A	TRX06	LW-2.5
FF16-47(S)	BFTX0204A	TRX06	LW-3
FF20-58(S)	BFTX0204A	TRX06	LW-3
FF25-79(S)	BFTX0307A	TRX10	LW-4
FF32-100(S)	BFTX0307A	TRX10	LW-5

Pull stud bolt



DINOX

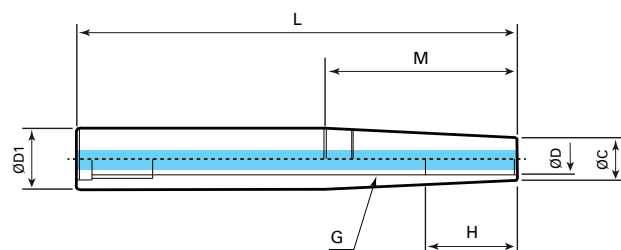
S(T)
SHANK



DSC/M	-----	142
DSC/S	-----	143
SDC	-----	144
SDC/S	-----	145
FBH	-----	146
FBH(MINI)	-----	147
DTN	-----	148



Straight shank shrinking chuck

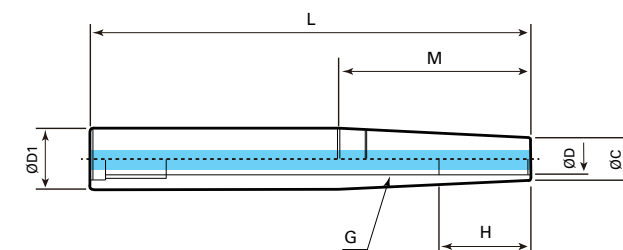


 This symbol means built-in through coolant system

- Features, see page 24 **24P** 
- Spare part, see page 70 **70P** 

[illegible]

Straight shank shrinking chuck



 This symbol means built-in through coolant system

- Features, see page 24 **24P** ➔
- Spare part, see page 70 **70P** ➔

[illegible]

BT

 $s(t)$

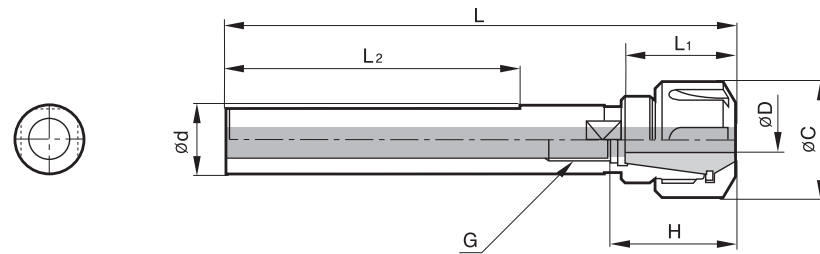
HSK

SK

cBN/PCD

OTHER

Straight shank collet chuck



- Features, see page 31
- Collet, see page 82
- Spare part, see page 84

 This symbol means optional through coolant system

[illegible]

Straight shank collet chuck slim type



Fig. 1

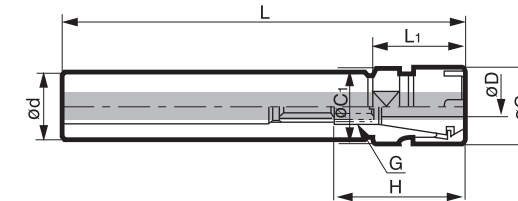
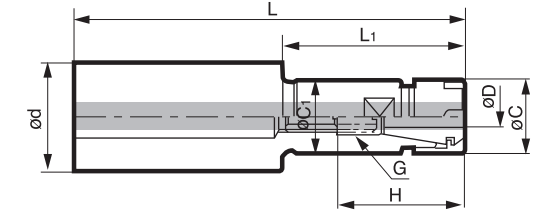


Fig. 2



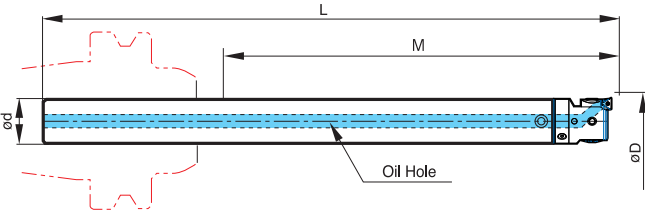
- Features, see page 31
- Collet, see page 82
- Spare part, see page 84

 This symbol means built-in through coolant system

[illegible]

S-FBH/B

Small micro boring bar with carbide/steel



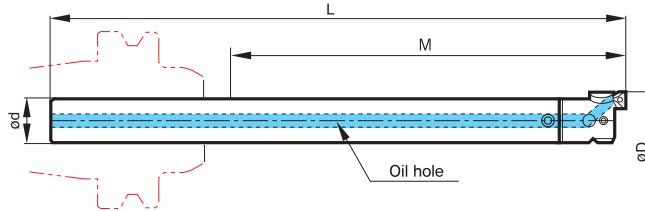
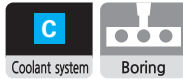
C This symbol means built-in through coolant system

- Features, see page 42 **42P**
- Spare part, see page 117 **117P**

	Designation	Ød	ØD		L	M (Max. boring depth)	Designation			kg
			min	max			Shank	Boring head	Bite	
S19W, S25W, S32W, S19, S25, S32	S19W-FBH20B-120	19	20	26	190	120	S19W-MD19F-157	FBH1920B	FBB20N	0.6
	S19W-FBH20B-140	19	20	26	210	140	S19W-MD19F-177	FBH1920B	FBB20N	0.7
	S19W-FBH20B-160	19	20	26	230	160	S19W-MD19F-197	FBH1920B	FBB20N	0.8
	S25W-FBH26B-150	25	26	34	235	150	S25W-MD25F-197.5	FBH2526B	FBB26N	1.4
	S25W-FBH26B-175	25	26	34	260	175	S25W-MD25F-222.5	FBH2526B	FBB26N	1.6
	S25W-FBH26B-200	25	26	34	285	200	S25W-MD25F-247.5	FBH2526B	FBB26N	2
	S32W-FBH33B-180	32	33	43	280	180	S32W-MD32F-239	FBH3233B	FBB33N	2.8
	S32W-FBH33B-240	32	33	43	340	240	S32W-MD32F-299	FBH3233B	FBB33N	3.5
	S19-FBH20B-40	19	20	26	110	40	S19-MD19F-77	FBH1920B	FBB20N	0.1
	S19-FBH20B-80	19	20	26	150	80	S19-MD19F-117	FBH1920B	FBB20N	0.2
	S25-FBH26B-50	25	26	34	135	50	S25-MD25F-97.5	FBH2526B	FBB26N	0.4
	S25-FBH26B-100	25	26	34	185	100	S25-MD25F-147.5	FBH2526B	FBB26N	0.6
	S32-FBH33B-90	32	33	43	190	90	S32-MD32F-149	FBH3233B	FBB33N	1.1
	S32-FBH33B-120	32	33	43	220	120	S32-MD32F-179	FBH3233B	FBB33N	1.2

S-FBH

Small micro boring bar with carbide/steel



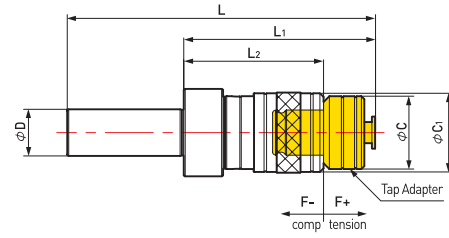
C This symbol means built-in through coolant system

- Spare part, see page 117 **117P**

	Designation	Ød	ØD		L	M (Max. boring depth)	Designation			kg
			min	max			Shank	Boring head	Bite	
S14W, S16W, S14, S16	S14W-FBH15-85	14	15	18	155	85	S14W-M6-123	FBH15	FBB15-C	0.2
	S14W-FBH15-110	14	15	18	180	110	S14W-M6-148	FBH15	FBB15-C	0.3
	S16W-FBH18-95	16	18	22	165	95	S16W-M8-128	FBH18	FBB15-C	0.3
	S16W-FBH18-125	16	18	22	195	120	S16W-M8-158	FBH18	FBB15-C	0.4
	S14-FBH15-40	14	15	18	110	40	S14-M6-78	FBH15	FBB15-C	0.1
	S16-FBH18-45	16	18	22	115	45	S16-M8-78	FBH18	FBB15-C	0.1

Spare Part			
Type (FBH)	Lock screw	Type (FBB)	Clamp screw
FBH15	BT02503	FBB15-C	BFTX02506
FBH18	BT02504	FBB15-C	BFTX02506

Straight shank tapping holder



97P ↗

DHE	-----	150
DSC/M MONO MIDDLE TYPE	--	151
DSC/S MONO SLIM TYPE	----	152
NPM	-----	153
SDC	-----	154
GSK	-----	155
NPU	-----	156
DST	-----	157
SLA	-----	158
FMC	-----	159
MD	-----	160
DBC	-----	161
KMB	-----	162
SMB	-----	162
SMH	-----	162

HSK-DHE

Hydraulic expansion chuck

DIN 69893-1

G6.3

15,000

5µm

C

Shank

G value

Max RPM

Run-out

Coolant system

Reaming

Milling

Chamfering

Fig. 1

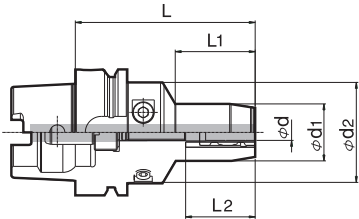
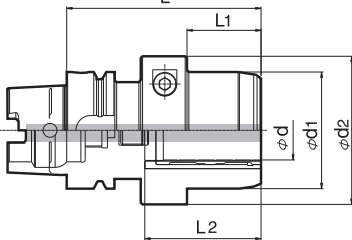


Fig. 2



L2: tool insertion depth(Min.~Max)

C This symbol means optional through coolant system

- Features, see page 29

● Collet, see page 62

● Spare part, see page 63
- 29P

62P

63P
-

HSK63A, HSK100A	Designation	Ød	L	Ød1	Ød2	L1	L2	Adjscrew	Fig.	kg
	HSK63A-DHE6-75	6	75	29	50	34	30~39.8	M5	1	1.0
	HSK63A-DHE8-75	8	75	31	50	34	30~39.8	M5	1	1.0
	HSK63A-DHE10-85	10	85	33	50	34	35~44.8	M5	1	1.2
	HSK63A-DHE12-90	12	90	35	50	40	41~50.8	M10	1	1.2
	HSK63A-DHE16-95	16	95	40	50	45	46~55.8	M10	1	1.3
	HSK63A-DHE20-100	20	100	44	50	50	49~58.8	M10	1	1.4
	HSK63A-DHE20-150	20	150	44	50	50	49~58.8	M10	1	2.0
	HSK63A-DHE25-110	25	110	50	70	48	56~67.8	M16	2	1.9
	HSK63A-DHE32-110	32	110	63	80	48	56~67.8	M16	2	2.3
HSK100A	HSK100A-DHE20-105	20	105	44	50	50	49~58.8	M10	1	2.8
	HSK100A-DHE25-115	25	90	50	63	62	58~67.8	M16	1	3.3
	HSK100A-DHE32-115	32	90	63	75	62	58~67.8	M16	1	3.8

HSK-DSC/M MONO MIDDLE TYPE

Shrinking chuck

DIN 69893-1

G2.5

25,000

3µm

C

Shank

G value

Max RPM

Run-out

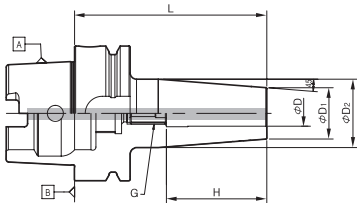
Coolant system

Drilling

Reaming

Milling

Chamfering



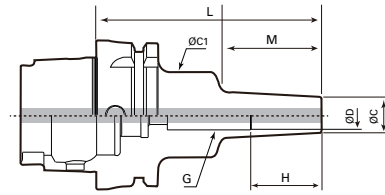
C This symbol means optional through coolant system

- Features, see page 24

※ Do not use adjust screw
- 24P
-

HSK63A	Designation	ØD	L	ØD1	ØC1	M	H	G
	HSK63A-DSC6M-95	6	95	10	26	42	18	M5
	HSK63A-DSC8M-95	8	95	13	36	42	24	M5
	HSK63A-DSC10M-120	10	120	16	36	67	30	M8
	HSK63A-DSC12M-120	12	120	19	36	67	30	M8
	HSK63A-DSC16M-120	16	120	24	50	67	32	M12

Shrinking chuck



- Will be stock

C This symbol means optional through coolant system

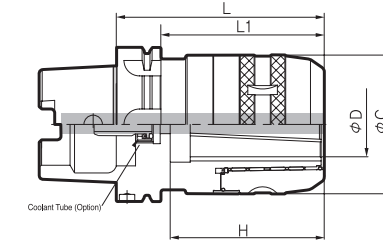
- Features, see page 24

※ Do not use adjust screw

24P 

[illegible]

New power milling chuck



- Straight Collet DCS ,DC type, see page 74.

C This symbol means optional through coolant system

74P

- Features, see page 26

- Taper collet(TC type), see page 75

- Spare part, see page 76

26P

75P

76P [illegible]

HSK-SDC
Collet chuck

DIN 69893-1

Ø20

C

Shank

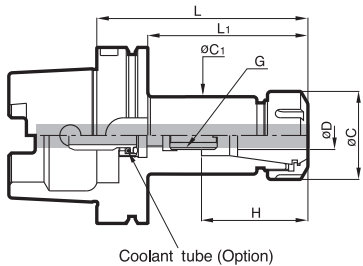
Max Dia

Coolant system

Drilling

Milling

Tapping



- Please use a collet with point spec to use through coolant
- Will be stock
- C This symbol means optional through coolant system

- Features, see page 31 31P ➔
- Collet, see page 82 82P ➔
- Spare part, see page 84 84P ➔

HSK63A, HSK100A	Designation	ØD (Clamping range)	L	H	Collet/Step	G	ØC	ØC1	kg	Will be stock
	HSK63A-SDC10-95	1.0~10.0	95	44.5	GERC16/1.0	M10	28	28	1.0	●
	HSK63A-SDC13-95	1.0~13.0	95	49	GERC20/1.0	M13	35	35	1.2	●
	HSK63A-SDC16-100	1.0~16.0	90	50	GERC25/1.0	M18	42	42	1.3	●
	HSK63A-SDC20-110	1.0~20.0	110	60	GERC32/1.0	M13	50	44	1.4	●
	HSK100A-SDC16-110	1.0~16.0	110	50	GERC25/1.0	M18	42	42	3.2	●
	HSK100A-SDC20-120	2.0~20.0	120	60	GERC32/1.0	M10	50	44	3.4	●

HSK-GSK
Great slim type collet chuck

DIN 69893-1

20,000

G2.5

Ø25

C

Shank

Max RPM

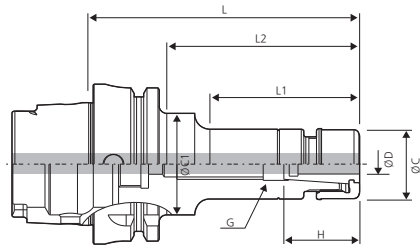
G value

Max Dia

Coolant system

Drilling

Milling

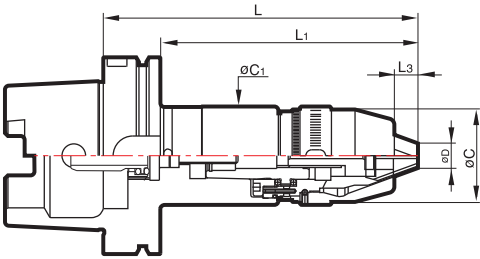


- Please use an waterproof collet to use through coolant
- C This symbol means optional through coolant system

- Features, see page 33 33P ➔
- Collet, see page 90 90P ➔
- Spare part, see page 93 93P ➔

HSK63A, HSK100A	Designation	ØD (Clamping range)	L	L1	L2	H	Collet/ Step	G	ØC	ØC1	MAX RPM
	HSK63A-GSK6-100	1.0~6.0	100	51	61	35	HC6/0.5	M8	19.5	32	20,000
	HSK63A-GSK10-105	2.0~6.0	105	73	118	50	HC10/0.5	M12	27.5	34.5	20,000
	HSK63A-GSK16-120	3.0~16.0	120	58	58	60	HC16/0.5	M18	40	40	20,000
	HSK63A-GSK20-120	4.0~20.0	120	60	60	70	HC20/0.5	M22	48	48	20,000
	HSK100A-GSK6-120	1.0~6.0	120	55	64	35	HC6/0.5	M8	19.5	32	15,000
	HSK100A-GSK10-120	2.0~10.0	120	57	57	50	HC10/0.5	M12	27.5	27.5	15,000
	HSK100A-GSK16-140	3.0~16.0	140	62	62	60	HC16/0.5	M18	40	40	15,000
	HSK100A-GSK25-155	16.0~25.0	155	62	62	85	HC25/0.5	M28	55	55	15,000

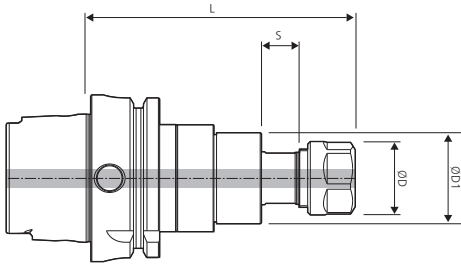
HSK-NPU
Drill chuck



Legend: C This symbol means unavailable with through coolant system; Spare part, see page 95; 95P

Table with 6 columns: Designation, ØD (Clamping range), ØC, L, L1, kg. Rows include HSK63A-NPU13-175 and HSK100A-NPU13-180.

HSK-DST
High speed synchro tapping chuck

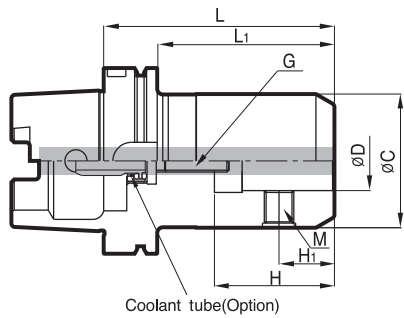


Legend: C This symbol means optional through coolant system; Features, see page 37; 37P; Collet, see page 99; 99P

Table with 10 columns: Designation, ØD, ØD1, L, S, Collet, Range, F-, F+. Rows include HSK63A-DST10-100 and HSK63A-DST22-130.

HSK-SLA

Side lock arbor



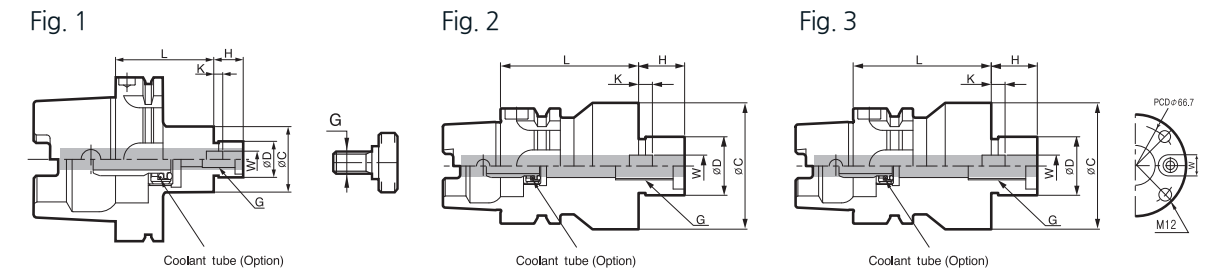
This symbol means optional through coolant system

Spare part, see page 101

HSK63A, HSK100A	Designation	Ød	L	ØC	H	H1	M	G	kg
	HSK63A-SLA20-100	20	100	52	51	25	M16	M12	2.0
	HSK63A-SLA25-105	25	105	65	59	25	M18	M12	2.7
	HSK63A-SLA32-105	32	105	72	63	30	M20	M12	2.9
	HSK100A-SLA20-105	20	105	52	51	25	M16	M12	3.9
	HSK100A-SLA25-110	25	110	65	59	25	M18	M12	4.0
	HSK100A-SLA32-125	32	125	72	63	30	M20	M12	4.3

HSK-FMC

Face mill arbor

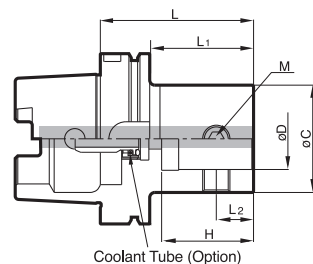


This symbol means optional through coolant system

Spare part, see page 105

HSK50A, HSK63A	Designation	Cutter diameter	ØD	L	ØC	H	W	K	G	kg	Fig.
	HSK50A-FMC16-40	40	16	40	38	17	8	5	M8	0.8	1
	HSK50A-FMC22-50	50/63	22	50	48	19	10	5.6	M10	0.9	1
	HSK63A-FMC16-50	40	16	50	38	17	8	5.0	M8	1.1	1
	HSK63A-FMC22-50	50/63	22	50	48	19	10	5.6	M10	1.2	1
	HSK63A-FMC27-60	80	27	60	60	21	12	6.3	M12	1.4	1
	HSK63A-FMC32-60	100	32	60	78	24	14	7.0	M16	1.8	2
	HSK63A-FMC40-60	125/160	40	60	89	27	15.87	8.0	M20	2	3

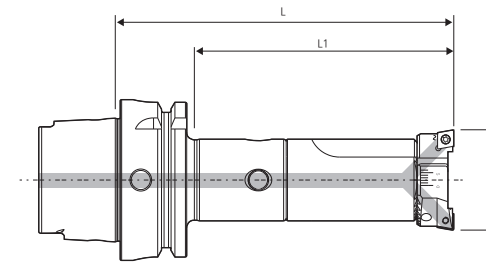
Basic holder



● Spare part, see page 115 **115P** ↗

HSK-DBC

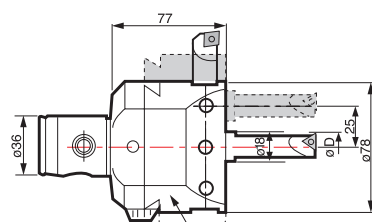
Balance cut tool(Modular type)



- Boring depth can be changed by variety of MD arboor and extension bar.



Micro boring



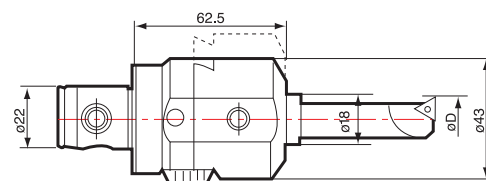
1 DIV = $\phi 0.02\text{mm}$

 This symbol means unavailable with through coolant system

- Boring range, see page 124 **124P** ➔
- Spare part, see page 125 **125P** ➔

HSK-SMB

Small micro boring bar



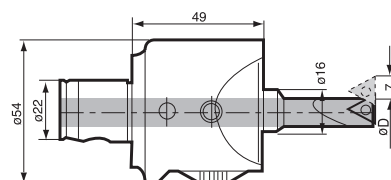
1DIV = $\varnothing 0.02\text{mm}$

 This symbol means unavailable with through coolant system

- Boring range, see page 124 **124P**
- Spare part, see page 125 **125P**

HSK-SMH

Small micro boring bar



1 DIV = $\varnothing 0.01\text{mm}$

C This symbol means optional through coolant system

- Boring range, see page 124 **124P** 
- Spare part, see page 125 **125P** 

162 DINOX

SK
SHANK



DHE	-----	164
DSC/M MONO MIDDLE TYPE	--	165
DSC/S MONO SLIM TYPE	-----	166
NPM	-----	167
SDC	-----	168
GSK	-----	169
NPU	-----	170
DTN	-----	171
DST	-----	172
SLA	-----	173
FMC	-----	174
MD	-----	175
MTA	-----	176
FBH/B	-----	177
FBC, TBC	-----	178
DBC	-----	179
KMB	-----	180
SMB	-----	180
SMH	-----	180

SK-DHE

Hydraulic expansion chuck

DIN69871
-1A/B
Shank

G6.3
G value

15,000
Max RPM

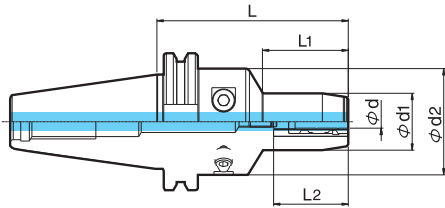
5µm
Run-out

C
Coolant system

Reaming

Milling

Chamfering



● Will be stock

C This symbol means built-in through coolant system

- Features, see page 29

● Collet, see page 62

● Spare part, see page 63
- 29P

62P

63P

SK30, SK40, SK50	Designation	ød	L	ød1	ød2	L1	L2	Adjscrew	Fig.	kg	Will be stock
	SK30-DHE20-90	20	90	44	90	45	49~58.8	M10	1	1.1	
	SK40-DHE6-90	6	90	29	49.5	40	30~39.8	M5	1	1.4	
	SK40-DHE8-90	8	90	31	49.5	40	30~39.8	M5	1	1.4	
	SK40-DHE10-90	10	90	33	50	40	35~44.8	M5	1	1.5	
	SK40-DHE12-90	12	90	35	50	40	41~50.8	M10	1	1.5	
	SK40-DHE12-140	12	140	35	50	40	41~50.8	M10	1	2.3	
	SK40-DHE14-90	14	90	36	50	40	43~52.8	M10	1	1.5	
	SK40-DHE16-90	16	90	40	50	45	46~55.8	M10	1	1.5	
	SK40-DHE18-90	18	90	42	50	45	49~58.8	M10	1	1.5	
	SK40-DHE20-90	20	90	44	50	47	49~58.8	M10	1	1.5	
	SK40-DHE20-140	20	140	44	50	47	49~58.8	M10	1	2.3	
	SK50-DHE12-90	12	90	35	50	34	41~50.8	M10	1	4.0	
	SK50-DHE12-140	12	140	35	50	34	41~50.8	M10	1	4.6	●
	SK50-DHE14-90	14	90	36	50	34	43~52.8	M10	1	4.0	
	SK50-DHE16-90	16	90	40	50	34	46~55.8	M10	1	4.1	
	SK50-DHE18-90	18	90	42	50	34	49~58.8	M10	1	4.1	
	SK50-DHE20-90	20	90	44	50	34	49~58.8	M10	1	4.2	
	SK50-DHE20-140	20	140	44	50	34	49~58.8	M10	1	4.7	●

SK-DSC/M

MONO MIDDLE TYPE

Shrinking chuck

DIN69871
-1A/B
Shank

G6.3
G value

3µm
Run-out

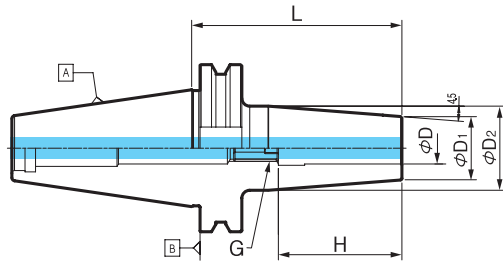
C
Coolant system

Drilling

Reaming

Milling

Chamfering



- Features, see page 24

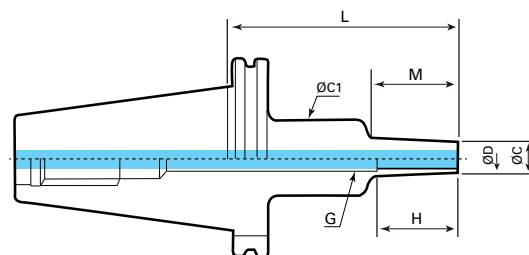
※ Adjust screw, see page 70
- 24P

70P

C This symbol means built-in through coolant system

SK40	Designation	øD	L	ød1	ød2	M	H	G
	SK40-DSC6M-95	6	95	10	26	42	18	M5
	SK40-DSC6M-120	6	120	10	26	67	18	M5
	SK40-DSC8M-95	8	95	13	36	42	24	M5
	SK40-DSC8M-120	8	120	13	36	67	24	M5
	SK40-DSC10M-95	10	95	16	36	42	30	M8
	SK40-DSC10M-120	10	120	16	36	67	30	M8
	SK40-DSC12M-95	12	95	19	36	42	30	M8
	SK40-DSC12M-120	12	120	19	36	67	30	M8
	SK40-DSC16M-95	16	95	24	50	42	32	M12
	SK40-DSC16M-120	16	120	24	50	67	32	M12
	SK40-DSC20M-95	20	95	29	50	42	40	M12
	SK40-DSC20M-120	20	120	29	50	67	40	M12

Shrinking chuck



- Will be stock

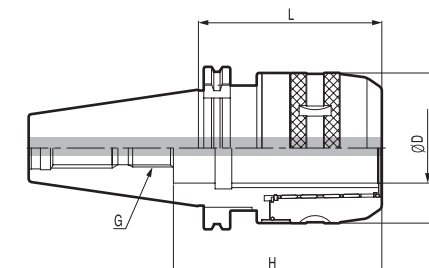
 This symbol means built-in through coolant system

- Features, see page 24

※ Do not use adjust screw

24P [illegible]

New power milling chuck



- Straight collet DCS ,DC Type, see page 74

C This symbol means optional through coolant system

74P 

- Features, see page 26

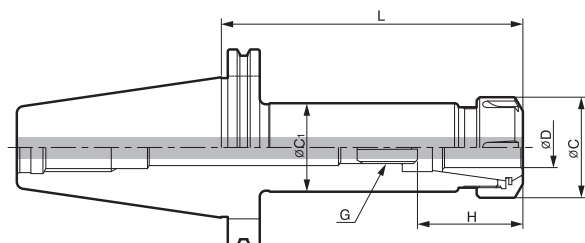
- Taper collet(TC type), see page 75

- Spare part, see page 76

26P ↗

75P 76P [illegible]

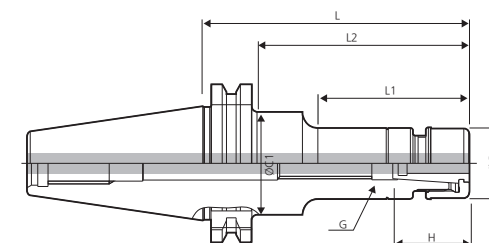
Collet chuck



- 84P
- 

[illegible]

Great slim type collet chuck



- 93P
- 

[illegible]

SK-DST

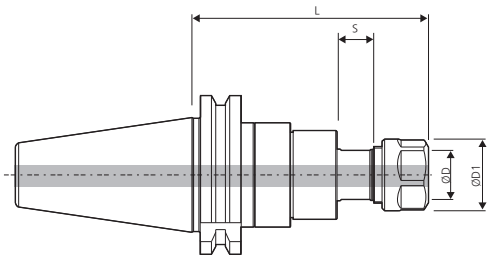
High speed synchro tapping chuck

DIN69871
-1A/B
Shank

G6.3
G value

C
Coolant system

Tapping



C This symbol means optional through coolant system

- Features, see page 37 37P ➔
- Collet, see page 99 99P ➔

SK40, SK50	Designation	ØD	ØD1	L	S	Collet	Range	F-	F+
	SK40-DST10-110	28	40.4	110	11	TER16	M3~M10	0.5	0.5
	SK40-DST22-120	49.5	60	110	18	TER32	M6~M22	0.7	0.7
	SK50-DST10-110	28	40.4	110	11	TER16	M3~M10	0.5	0.5
	SK50-DST22-120	49.5	60	120	18	TER32	M6~M22	0.7	0.7

SK-SLA

Side lock arbor

DIN69871
-1A/B
Shank

C
Coolant system

Drilling

Milling

Fig. 1

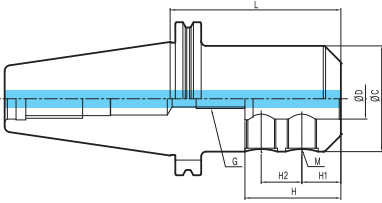
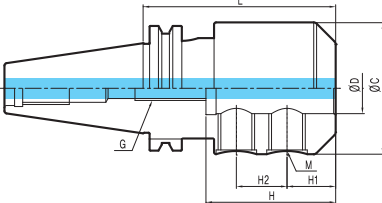


Fig. 2



C This symbol means built-in through coolant system

- Spare part, see page 101 101P ➔

SK40, SK50	Designation	ØD	L	ØC	H	H1	H2	M	G	Fig.	kg
	SK40-SLA16-75	16	75	48	49	24	-	M14	M12	-	1.5
	SK40-SLA20-75	20	75	52	51	25	-	M16	M12	-	1.7
	SK40-SLA25-95	25	95	65	59	24	25	M18	M12	2	2.0
	SK40-SLA32-105	32	105	72	63	24	28	M20	M12	2	2.4
	SK50-SLA16-90	16	90	48	49	24	-	M14	M12	-	4.2
	SK50-SLA20-90	20	90	52	51	25	-	M16	M12	-	4.4
	SK50-SLA25-105	25	105	65	59	24	25	M18	M12	1	4.4
	SK50-SLA32-120	32	120	72	63	24	28	M20	M12	1	5.0
	SK50-SLA40-120	40	120	80	73	30	32	M20	M12	1	5.4

BT

S(T)

HSK

SK

NT

cBN/PCD

OTHER



Fig. 1

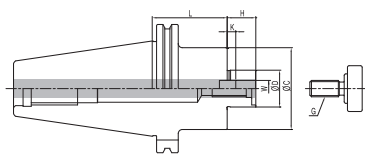


Fig. 2

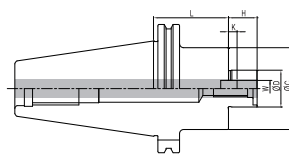
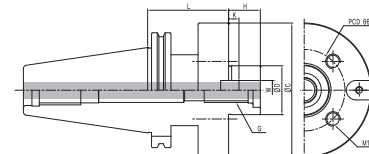


Fig. 3



C This symbol means optional through coolant system

● Spare part, see page 104 **104P** 

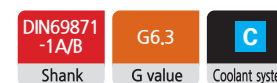
[illegible]

Fig. 1

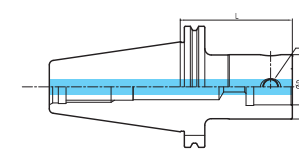


Fig. 2

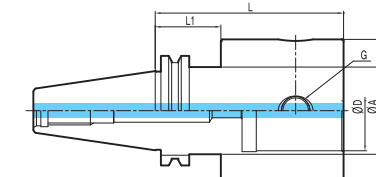
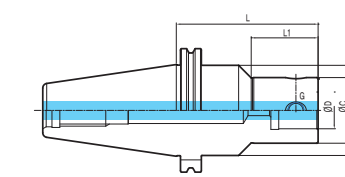


Fig. 3



C This symbol means built-in through coolant system

● Spare part, see page 115 **115P** ➔

[illegible]

Morse taper arbor

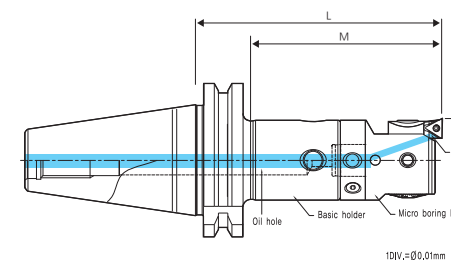


Technical drawing of a nozzle assembly. The drawing shows a cross-section of a nozzle with a tapered body. Key dimensions and labels include:

- L : Length of the nozzle tip.
- $\varnothing D$: Outer diameter of the nozzle tip.
- $\varnothing C$: Inner diameter of the nozzle tip.
- MT No.**: Label pointing to the nozzle body.

Technical drawing of a mechanical part. The drawing shows a cross-section of a component with a central shaft. The total length of the shaft is labeled L . The diameter of the shaft is labeled $\varnothing D$. The diameter of the central hole is labeled $\varnothing C$. The material is labeled $MT No.$. The drawing includes a dashed line indicating a hidden feature.

- ## Micro boring bar (balanced type)



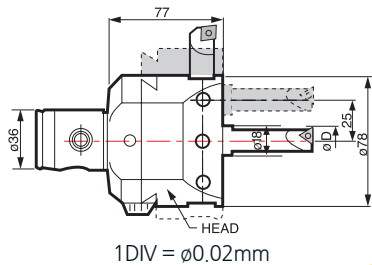
- SK40, SK50

Designation	Designation		Boring range		L	M	
	Head designation	Bite designation	Body designation	min			max
	FBH1920B	FBB20N-O-OO	SK40-MD19F-80R	20(24)	26(30)	113	45
	FBH2526B	FBB26N-O-OO	SK40-MD25F-80R	26(32)	34(40)	117	59
	FBH3233B	FBB33N-O-OO	SK40-MD32F-115R	33(40)	43(50)	156	77
	FBH4042B	FBB42N-O-OO	SK40-MD40F-100	42(50)	54(62)	147	125
	FBH5053B	FBB53N-O-OO	SK40-MD50F-100	53(65)	70(82)	157	135
	FBH6368B	FBB68N-O-OO	SK40-MD63F-70	68(90)	100(122)	141	121
	FBH6398B	FBB68N-O-OO	SK40-MD63F-70	98(120)	150(172)	141	121
	FBH1920B	FBB20N-O-OO	SK50-MD19F-85R	20(24)	26(30)	118	45
FBH2526B	FBB26N-O-OO	SK50-MD25F-105R	26(32)	34(40)	142	59	
FBH3233B	FBB33N-O-OO	SK50-MD32F-110	33(40)	43(50)	141	128	
FBH4042B	FBB42N-O-OO	SK50MD40F-145	42(50)	54(62)	192	167	
FBH5053B	FBB53N-O-OO	SK50-MD50F-240R	53(65)	70(82)	297	182	
FBH6368B	FBB68N-O-OO	SK50-MD63F-130	68(90)	100(122)	201	178	
FBH6398B	FBB68N-O-OO	SK50-MD63F-130	98(120)	150(172)	201	178	
FBH8098B	FBB68N-O-OO	SK50-MD80F-150	98(120)	150(172)	221	198	

- 176 DINOX**

SK-KMB

Micro boring



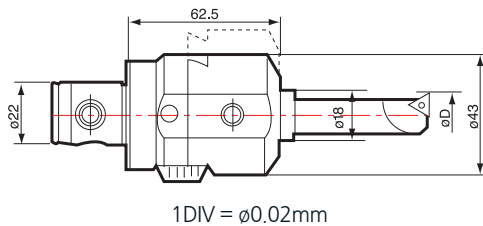
C This symbol means unavailable with through coolant system

- Boring range, see page 124 124P ➔
- Spare part, see page 125 125P ➔

Boring head	Bite	MD NO.	L (Head length)	kg
KMB6336	BB18-O(S)	SKOO-MD63F	77	2.2

SK-SMB

Small micro boring bar



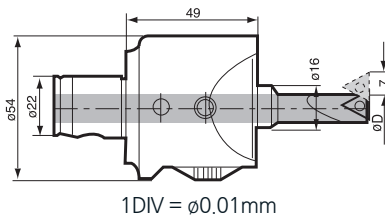
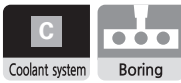
C This symbol means unavailable with through coolant system

- Boring range, see page 124 124P ➔
- Spare part, see page 125 125P ➔

Boring head	Bite	MD NO.	L (Head length)	kg
SMB4022	BB18-O(S)	SKOO-MD40F	62.5	0.6

SK-SMH

Small micro boring bar



C This symbol means optional through coolant system

- Boring range, see page 124 124P ➔
- Spare part, see page 125 125P ➔

Boring head	Bite	MD NO.	L (Head length)	kg
SMH4022	BB16-O(S)	SKOO-MD40F	49	0.7

NT SHANK



NPM	182
NPM SET	183
FMA	184



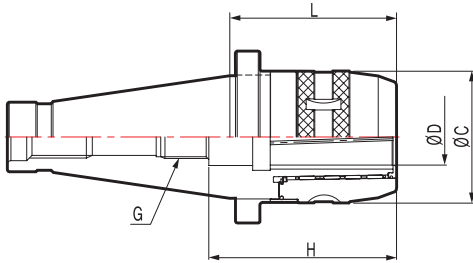
NT-NPM

New power milling chuck

DIN2080
JISB6101

15µm

C



- Straight collet DCS ,DC type, see page 74. 74P ➔
- This symbol means unavailable with through coolant system

- Features, see page 26 26P ➔
- Taper collet(TC type), see page 75 75P ➔
- Spare part, see page 76 76P ➔

Designation	ØD	ØC	L	G	Collet	kg
NT40-NPM32-95	32	75	95	U5/8"-11	DC32,DCS32	2.9
NT50-NPM32-95	32	75	95	U1"-8	DC32,DCS32	4.4
NT50M-NPM32-95	32	75	95	M24	DC32,DCS32	4.4
NT50-NPM42-95	42	95	95	U1"-8	DC42,DCS42	4.8
NT50M-NPM42-95	42	95	95	M24	DC42,DCS42	4.8

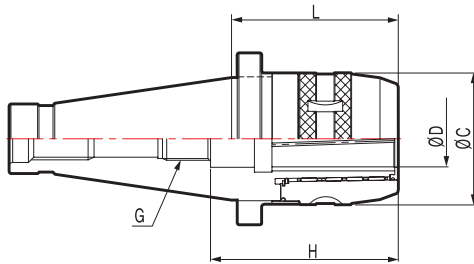
NT-NPM SET

New power milling chuck set.

DIN2080
JISB6101

15µm

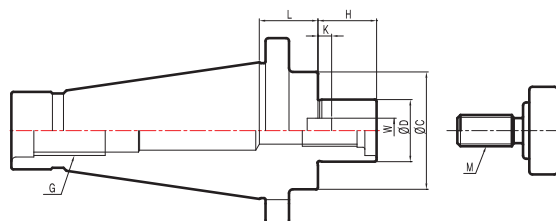
C



- This symbol means unavailable with through coolant system

Designation	Body	Collet	MT Collet	DJT	spanner
NT40-NPM32-95(B)	NT40-NPM32-95	DC32-6, 8, 10, 12, 16, 20, 25	TC32-MT1,2,3	DJT32-6	75-79
NT50-NPM32-95(B)	NT50-NPM32-95	DC32-6, 8, 10, 12, 16, 20, 25	TC32-MT1,2,3	DJT32-6	75-79
NT50-NPM42-95(B)	NT50-NPM42-95	DC42-6, 8, 10, 12, 16, 20, 25, 32	TC42-MT1,2,3,4	DJT42-6	92-96

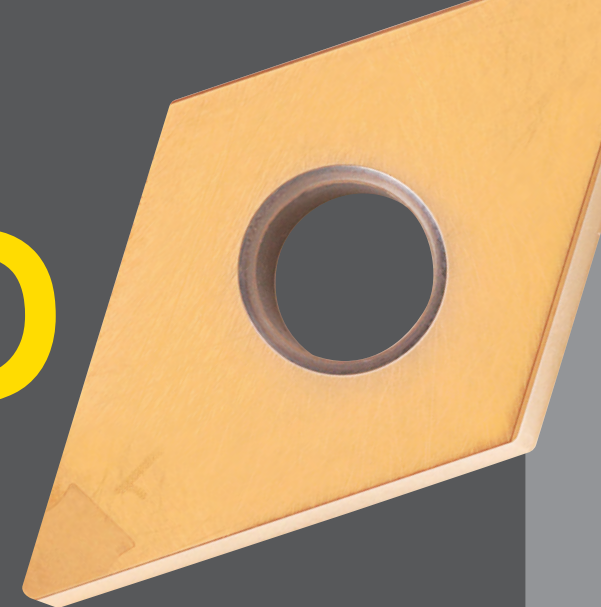
Face mill arbor



104P ↗

NT40 NT50

cBN/PCD SHANK



INSERT CODE SYSTEM(ISO)	186
cBN Comparison table of cBN competitors	188
cBN Series	190
PCD	201

INSERT CODE SYSTEM (ISO)

INSERT CODE SYSTEM (ISO)



1 Insert shape

C N M G 12 04 08 - VM

C D E K L R S T V W

3 Tolerance

C N M G 12 04 08 - VM

d : Incribed circle
t : Thickness
m : Refer to figure

Symbol	d	m	t
A	±0.025	±0.005	±0.025
C	±0.025	±0.013	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J *	±0.05 ~ ±0.15	±0.005	±0.025
K *	±0.05 ~ ±0.15	±0.013	±0.025
L *	±0.05 ~ ±0.15	±0.025	±0.025
M *	±0.05 ~ ±0.15	±0.08 ~ ±0.20	±0.13
N *	±0.05 ~ ±0.15	±0.08 ~ ±0.18	±0.025
U *	±0.08 ~ ±0.25	±0.13 ~ ±0.38	±0.13

* Sides are based on unground insert

Tolerance on C,E,H,M,O,P,R,S,T,W Insert Shape(Exceptional case)

d	Tolerance on d		Tolerance on m	
	J, K, L, M, N	U	M, N	U
6.35	±0.05	±0.08	±0.08	±0.13
9.525	±0.05	±0.08	±0.08	±0.13
12.7	±0.08	±0.13	±0.13	±0.20
15.875	±0.10	±0.18	±0.15	±0.27
19.05	±0.10	±0.18	±0.15	±0.27
25.4	±0.13	±0.25	±0.18	±0.38

Olerance on D Insert Shape(Exceptional case)

d	Tolerance on d	Tolerance on m
6.35	±0.05	±0.11
9.525	±0.05	±0.11
12.7	±0.08	±0.15
15.875	±0.10	±0.18
19.05	±0.10	±0.18

2 Relief angle

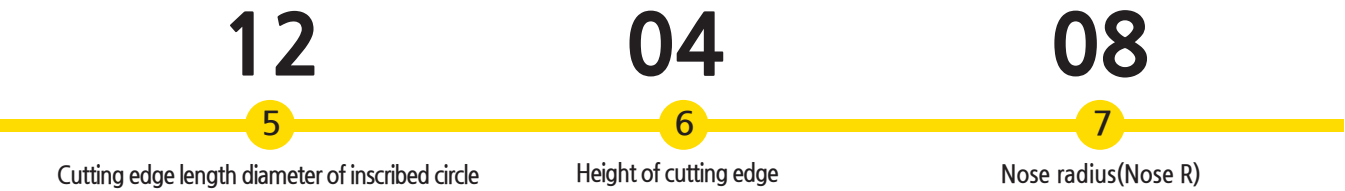
C N M G 12 04 08 - VM

B C D E F N P O

4 Cross section type

C N M G 12 04 08 - VM

A B C F G H J M N Q R T U W X



5 Cutting edge length, Diameter of Incribed circle

C N M G 12 04 08 - VM

Symbol							IC	
C	d	S	T	R	V	W		
Metric							d(mm)	
03	04	03	06	03	-	02	1.2(5)	3.97
04	05	04	08	04	08	53	1.5(6)	4.76
05	06	05	09	05	09	03	1.8(7)	5.56
-	-	-	-	06	-	-	-	6.00
06	07	06	11	06	11	04	2	6.35
08	09	07	13	07	13	05	2.5	7.94
-	-	-	-	08	-	-	-	8.00
09	11	09	16	09	16	06	3	9.525
-	-	-	-	10	-	-	-	10.00
11	13	11	19	11	19	07	3.5	11.11
-	-	-	-	12	-	-	-	12.00
12	15	12	22	12	22	08	4	12.70
14	17	14	24	14	24	09	4.5	14.29
16	19	15	27	15	27	10	5	15.875
-	-	-	-	16	-	-	-	16.00
17	21	17	30	17	30	11	5.5	17.46
19	23	19	33	19	33	13	6	19.05
-	-	-	-	20	-	-	-	20.00
22	27	22	38	22	38	15	7	22.225
-	-	-	-	25	-	-	-	25.00
25	31	25	44	25	44	17	8	25.40
32	38	31	54	31	54	21	10	31.75
-	-	-	-	32	-	-	-	32.00

() Symbol for small size insert

7 Nose Radius (Nose R)

C N M G 12 04 08 - VM

Symbol		Corner radius	
Metric	Inch	M, N	Inch
01	0	0.1	0.004
02	0.5	0.2	0.008
04	1	0.4	1/64
08	2	0.8	1/32
12	3	1.2	3/64
16	4	1.6	1/16
20	5	2.0	5/64
24	6	2.4	3/32
28	7	2.8	7/64
32	8	3.2	1/8
00	-	Round Insert(Inch)	
M0	-	Round Insert(Metric)	

6 Height of Cutting Edge

C N M G 12 04 08 - VM

Symbol		Height of Cutting Edge	
Metric	Inch	M, N	Inch
01	1(2)	1.59	1/16
T0	1.125	1.79	9/128
T1	1.2	1.98	5/64
02	1.5(3)	2.38	3/32
T2	1.75	2.78	7/64
03	2	3.18	1/8
T3	2.5	3.97	5/32
04	3	4.76	3/16
05	3.5	5.56	7/32
06	4	6.35	1/4
07	5	7.94	5/16
09	6	9.52	3/8
11	7	11.11	7/16
12	8	12.70	1/2

() Symbol for small size insert



cBN COMPARISON TABLE OF cBN COMPETITORS

Use classification		DINE(KORLOY)	NTK	KYOCERA	TAEGU TEC
H (Hardened steel)	H01	DNC100 KB420 KB1000	B521K	KBN510 KBN05M KBN10M	
	H10	DNC250 KB320 KB2000	B521K	KBN525 KBN25M KBN05M	KB90A TB650
	H20	KB420 KB425 DNC350 KB400 DNC400	B421K B422K	KBN30M KBN35M KBN900	
	H30	KB335 DNC350	B421K B422K		
K (Cast iron)	K01	KB350	B230K	KBN60M KBN65B	KB90
	K10	KB370	B205K B300K	KBN60M KBN900 KBN65B	KB90A
	K20	KB370 KB800	B205K B300K	KBN900	KB90A
	K30	DBN800	B205K B300K		
N (Non ferrous metal)	N01	KB800			
S (Heat resistance alloy)	S01	KB370		KBN65B	
	S10	KB370			

cBN COMPARISON TABLE OF cBN COMPETITORS

DINE(KORLOY)	SUMITOMO	TUNGALOY	SECO	MITSUBISHI	SANDVIK	KENNAMETAL
DNC100 KB420 KB1000	BN1000 BNC100	BXM10 BX310	CBN10 CBN100 CBN60K	MBC010 MB810	CB50 CB7050	PB250
DNC250 KB320 KB2000	BNC160 BNC200 BN2000	BXM10 BX330 BX530	CBN10 CBN100 CBN150 CBN60K CBN160C	MBC020 MB8025 BC8020	CB20 CB7015	KB1645 KD050 KD120 KB9610
KB420 KB425 DNC350 KB400 DNC400	BNC200 BNX20	BXM20 BX360	CBN150 CBN160C	BC8020 MB8025 MB825	CB7025 CB7035	KB5625 KB1615
KB335 DNC350	BNC300 BN350 BNX25	BXM20 BXC50 BX380		BC8020 MB835		KB9640
KB350	BNC500	BX930 BX870		MB710	CB50 CB7050	KD120 PB100
KB370	BN700 BN7000 BN7500	BX470 BX480 BX950	CBN200 CBN300 CBN300P CBN400C	MB710 MB730	CB7925 CB7525	KB1645 KB9610
KB370 KB800	BN700 BN7000 BNS800	BXC90 BX90S	CBN200 CBN300 CBN300P CBN400C	MB730 MBS140 BC5030		
DBN800	BNS800	BX90S BXC90	CBN500	MBS140 BC5030		KB9640 KB1340
KB800	BN700 BN7000					KD120 PB100
KB370	BN700 BN7000	BX950		MB730		
KB370						

BT

S(T)

HSK

SK

NT

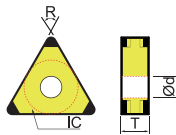
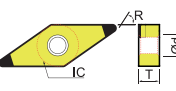
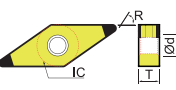
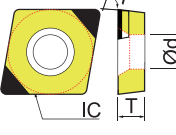
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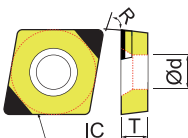
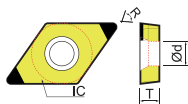
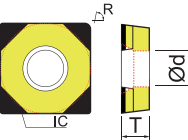
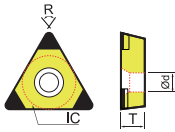
Geomethy	Designation	Coating material				Non-coating material								weight	Measurement (mm)					
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400		KB410	KB420	KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)
	2NU-CNGA120404	●	●								●					9.85	12.7	4.76	0.4	5.16
	2NU-CNGA120408	●	●				●				●					9.85	12.7	4.76	0.8	5.16
	2NU-CNGA120412	●	●								●					9.85	12.7	4.76	1.2	5.16
	2NU-CNGA120404F	●														9.85	12.7	4.76	0.4	5.16
	2NU-CNGA120408F	●														9.85	12.7	4.76	0.8	5.16
	2NU-CNGA120412F	●														9.85	12.7	4.76	1.2	5.16
	2NU-CNGA120404T	●														9.85	12.7	4.76	0.4	5.16
	2NU-CNGA120408T	●														9.85	12.7	4.76	0.8	5.16
	2NU-CNGA120412T	●														9.85	12.7	4.76	1.2	5.16
	2NU-CNGA120404W	●														9.85	12.7	4.76	0.4	5.16
	2NU-CNGA120408W	●	●													9.85	12.7	4.76	0.8	5.16
	2NU-CNGA120412W	●														9.85	12.7	4.76	1.2	5.16
	2NU-CNGA120404WF	●														9.85	12.7	4.76	0.4	5.16
	2NU-CNGA120408WF	●														9.85	12.7	4.76	0.8	5.16
	2NU-CNGA120412WF	●														9.85	12.7	4.76	1.2	5.16
	2NU-CNGA120404WT															9.85	12.7	4.76	0.4	5.16
	2NU-CNGA120408WT															9.85	12.7	4.76	0.8	5.16
	2NU-CNGA120412WT															9.85	12.7	4.76	1.2	5.16
	T-2NU-CNGA120404															9.85	12.7	4.76	0.4	5.16
	T-2NU-CNGA120408	●														9.85	12.7	4.76	0.8	5.16
2-NU-CNMA120408							●								9.85	12.7	4.76	0.8	5.16	
	4NU-CNGA431														9.85	12.7	4.76	0.4	5.16	
	4NU-CNGA432														9.85	12.7	4.76	0.8	5.16	
	4NU-CNGA433														9.85	12.7	4.76	1.2	5.16	
	4NU-CNGA431F														9.85	12.7	4.76	0.4	5.16	
	4NU-CNGA432F														9.85	12.7	4.76	0.8	5.16	
	4NU-CNGA433F														9.85	12.7	4.76	1.2	5.16	
	4NU-CNGA431T														9.85	12.7	4.76	0.4	5.16	
	4NU-CNGA432T														9.85	12.7	4.76	0.8	5.16	
	4NU-CNGA433T														9.85	12.7	4.76	1.2	5.16	
	4NU-CNGA431W														9.85	12.7	4.76	0.4	5.16	
	4NU-CNGA432W														9.85	12.7	4.76	0.8	5.16	
	4NU-CNGA433W														9.85	12.7	4.76	1.2	5.16	
	4NU-CNGA431WF														9.85	12.7	4.76	0.4	5.16	
	4NU-CNGA432WF														9.85	12.7	4.76	0.8	5.16	
	4NU-CNGA433WF														9.85	12.7	4.76	1.2	5.16	
	4NU-CNGA431WT														9.85	12.7	4.76	0.4	5.16	
	4NU-CNGA432WT														9.85	12.7	4.76	0.8	5.16	
	4NU-CNGA433WT														9.85	12.7	4.76	1.2	5.16	
		2NU-DNGA150404	●	●								●				12.13	12.7	4.76	0.4	5.16
		2NU-DNGA150408	●	●								●				12.13	12.7	4.76	0.8	5.16
2NU-DNGA150412		●	●												12.13	12.7	4.76	1.2	5.16	
2NU-DNGA150404F		●													12.13	12.7	4.76	0.4	5.16	
2NU-DNGA150408F		●													12.13	12.7	4.76	0.8	5.16	
2NU-DNGA150412F		●													12.13	12.7	4.76	1.2	5.16	

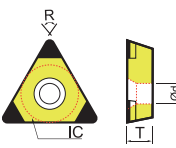
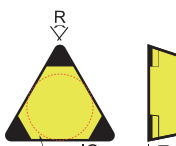
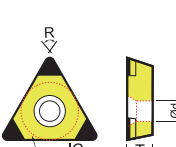
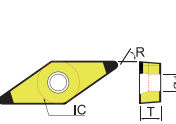
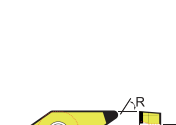
※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomethy	Designation	Coating material			Non-coating material										weight	Measurement (mm)					
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410		KB420	KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)	Ød (Hole size)
	2NU-DNGA150404T	●															12.13	12.7	4.76	0.4	5.16
	2NU-DNGA150408T	●															12.13	12.7	4.76	0.8	5.16
	2NU-DNGA150412T	●															12.13	12.7	4.76	1.2	5.16
	T-2NU-DNGA150408																12.13	12.7	4.76	0.8	5.16
	T-2NU-DNGA150412	●															12.13	12.7	4.76	1.2	5.16
	4NU-DNGA150404																12.13	12.7	4.76	0.4	5.16
	4NU-DNGA150408																12.13	12.7	4.76	0.8	5.16
	4NU-DNGA150412																12.13	12.7	4.76	1.2	5.16
	4NU-DNGA150404F																12.13	12.7	4.76	0.4	5.16
	4NU-DNGA150408F																12.13	12.7	4.76	0.8	5.16
	4NU-DNGA150412F																12.13	12.7	4.76	1.2	5.16
	4NU-DNGA150404T																12.13	12.7	4.76	0.4	5.16
	4NU-DNGA150408T																12.13	12.7	4.76	0.8	5.16
	4NU-DNGA150412T																12.13	12.7	4.76	1.2	5.16
	2NU-SNGA120404																9.88	12.7	4.76	0.4	5.16
	2NU-SNGA120408																9.88	12.7	4.76	0.8	5.16
	2NU-SNGA120412																9.88	12.7	4.76	1.2	5.16
	2NU-SNGA120404F																9.88	12.7	4.76	0.4	5.16
	2NU-SNGA120408F																9.88	12.7	4.76	0.8	5.16
	2NU-SNGA120412F																9.88	12.7	4.76	1.2	5.16
	2NU-SNGA120404T																9.88	12.7	4.76	0.4	5.16
	2NU-SNGA120408T																9.88	12.7	4.76	0.8	5.16
	2NU-SNGA120412T																9.88	12.7	4.76	1.2	5.16
	4NU-SNGA120404	●															9.88	12.7	4.76	0.4	5.16
	4NU-SNGA120408	●															9.88	12.7	4.76	0.8	5.16
	4NU-SNGA120412																9.88	12.7	4.76	1.2	5.16
	4NU-SNGA120404F																9.88	12.7	4.76	0.4	5.16
	4NU-SNGA120408F																9.88	12.7	4.76	0.8	5.16
	4NU-SNGA120412F																9.88	12.7	4.76	1.2	5.16
	4NU-SNGA120404T																9.88	12.7	4.76	0.4	5.16
	4NU-SNGA120408T																9.88	12.7	4.76	0.8	5.16
	4NU-SNGA120412T																9.88	12.7	4.76	1.2	5.16
	8NU-SNGA120404																9.88	12.7	4.76	0.4	5.16
	8NU-SNGA120408																9.88	12.7	4.76	0.8	5.16
	8NU-SNGA120412																9.88	12.7	4.76	1.2	5.16
	3NU-TNGA160404	●	●							●							7.19	9.525	4.76	0.4	3.81
	3NU-TNGA160408	●	●							●			●				7.19	9.525	4.76	0.8	3.81
	3NU-TNGA160412		●														7.19	9.525	4.76	1.2	3.81
	3NU-TNGA160404F	●															7.19	9.525	4.76	0.4	3.81
	3NU-TNGA160408F	●															7.19	9.525	4.76	0.8	3.81
	3NU-TNGA160412F																7.19	9.525	4.76	1.2	3.81
	3NU-TNGA160404T	●															7.19	9.525	4.76	0.4	3.81
	3NU-TNGA160408T	●															7.19	9.525	4.76	0.8	3.81
	3NU-TNGA160412T																7.19	9.525	4.76	1.2	3.81

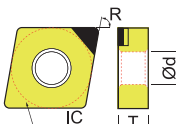
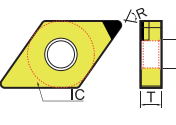
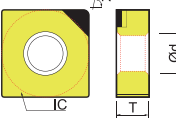
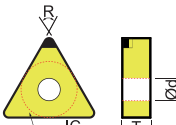
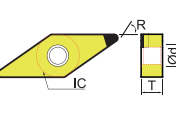
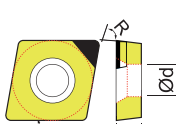
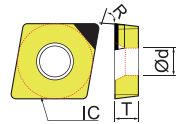
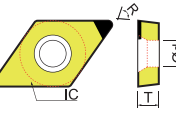
Geomethy	Designation	Coating material				Non-coating material								weight	Measurement (mm)						
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400		KB410	KB420	KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)	Ød (Hole size)
	6NU-TNGA160404																7.19	9.525	4.76	0.4	3.81
	6NU-TNGA160408																7.19	9.525	4.76	0.8	3.81
	6NU-TNGA160412																7.19	9.525	4.76	1.2	3.81
	2NU-VNGA160404		●	●							●						10.18	9.525	4.76	0.4	3.81
	2NU-VNGA160408		●	●				●			●						10.18	9.525	4.76	0.8	3.81
	2NU-VNGA160412																10.18	9.525	4.76	1.2	3.81
	2NU-VNGA160404F		●														10.18	9.525	4.76	0.4	3.81
	2NU-VNGA160408F		●														10.18	9.525	4.76	0.8	3.81
	2NU-VNGA160412F																10.18	9.525	4.76	1.2	3.81
	2NU-VNGA160404T		●														10.18	9.525	4.76	0.4	3.81
	2NU-VNGA160408T		●														10.18	9.525	4.76	0.8	3.81
	2NU-VNGA160412T																10.18	9.525	4.76	1.2	3.81
	4NU-VNGA160404																10.18	9.525	4.76	0.4	3.81
	4NU-VNGA160408																10.18	9.525	4.76	0.8	3.81
	4NU-VNGA160412																10.18	9.525	4.76	1.2	3.81
	4NU-VNGA160404F																10.18	9.525	4.76	0.4	3.81
	4NU-VNGA160408F																10.18	9.525	4.76	0.8	3.81
	4NU-VNGA160412F																10.18	9.525	4.76	1.2	3.81
	4NU-VNGA160404T																10.18	9.525	4.76	0.4	3.81
	4NU-VNGA160408T																10.18	9.525	4.76	0.8	3.81
	4NU-VNGA160412T																10.18	9.525	4.76	1.2	3.81
	2NU-CCGW060202		●														0.95	6.35	2.38	0.2	2.8
	2NU-CCGW060204		●								●						0.95	6.35	2.38	0.4	2.8
	2NU-CCGW060208																1.02	6.35	2.38	0.8	2.8
	2NU-CCGW060202F		●														0.95	6.35	2.38	0.2	2.8
	2NU-CCGW060204F		●														0.95	6.35	2.38	0.4	2.8
	2NU-CCGW060208F																1.02	6.35	2.38	0.8	2.8
	2NU-CCGW060202T		●														0.95	6.35	2.38	0.2	2.8
	2NU-CCGW060204T		●														0.95	6.35	2.38	0.4	2.8
	2NU-CCGW060208T																1.02	6.35	2.38	0.8	2.8
	2NU-CCGW060204W																0.95	6.35	2.38	0.4	2.8
	2NU-CCGW060208W																1.02	6.35	2.38	0.8	2.8
	2NU-CCGW060204WF																0.95	6.35	2.38	0.4	2.8
	2NU-CCGW060208WF																1.02	6.35	2.38	0.8	2.8
	2NU-CCGW060204WT																0.95	6.35	2.38	0.4	2.8
	2NU-CCGW060208WT																1.02	6.35	2.38	0.8	2.8
	2NU-CCGW09T304F		●														4.51	9.525	3.97	0.4	4.4
	2NU-CCGW09T304		●	●													4.51	9.525	3.97	0.4	4.4
	2NU-CCGW09T308		●	●													4.51	9.525	3.97	0.8	4.4
	2NU-CCGW09T312																4.51	9.525	3.97	1.2	4.4
	2NU-CCGW09T304		●														4.51	9.525	3.97	0.4	4.4
	2NU-CCGW09T308F		●														4.51	9.525	3.97	0.8	4.4
	2NU-CCGW09T312F																4.51	9.525	3.97	1.2	4.4

※ - W : Wiper type ※ T - Designation consists of 10 units, ● : Stock

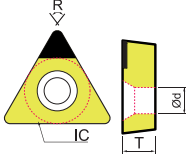
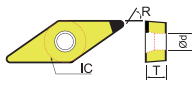
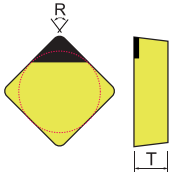
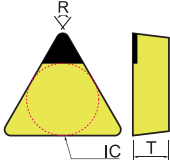
Geomethy	Designation	Coating material			Non-coating material										weight	Measurement (mm)					
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410		KB420	KB425	IC (Inscribed circle)	T (Thickness)	R (Nose R)	Ød (Hole size)
	2NU-CCGW09T304T	●															4.51	9.525	3.97	0.4	4.4
	2NU-CCGW09T308T	●															4.51	9.525	3.97	0.8	4.4
	2NU-CCGW09T312T																4.51	9.525	3.97	1.2	4.4
	2NU-CCGW09T304W																4.51	9.525	3.97	0.4	4.4
	2NU-CCGW09T308W	●															4.51	9.525	3.97	0.8	4.4
	2NU-CCGW09T312W																4.51	9.525	3.97	1.2	4.4
	2NU-CCGW09T304WF																4.51	9.525	3.97	0.4	4.4
	2NU-CCGW09T308WF	●															4.51	9.525	3.97	0.8	4.4
	2NU-CCGW09T312WF																4.51	9.525	3.97	1.2	4.4
	2NU-CCGW09T304WT																4.51	9.525	3.97	0.4	4.4
	2NU-CCGW09T308WT																4.51	9.525	3.97	0.8	4.4
	2NU-CCGW09T312WT																4.51	9.525	3.97	1.2	4.4
	2NU-DCGW070204										●						1.28	6.35	2.38	0.4	2.8
	2NU-DCGW070208																1.28	6.35	2.38	0.8	2.8
	2NU-DCGW070204F																1.26	6.35	2.38	0.4	2.8
	2NU-DCGW070208F																1.26	6.35	2.38	0.8	2.8
	2NU-DCGW070204T																1.26	6.35	2.38	0.4	2.8
	2NU-DCGW070208T																1.26	6.35	2.38	0.8	2.8
	2NU-DCGW11T302																4.82	9.525	3.97	0.2	4.4
	2NU-DCGW11T304	●	●								●						4.82	9.525	3.97	0.4	4.4
	2NU-DCGW11T308	●	●					●									4.82	9.525	3.97	0.8	4.4
	2NU-DCGW11T302F																4.82	9.525	3.97	0.2	4.4
	2NU-DCGW11T304F	●															4.82	9.525	3.97	0.4	4.4
	2NU-DCGW11T308F	●															4.82	9.525	3.97	0.8	4.4
	2NU-DCGW11T302T																4.82	9.525	3.97	0.2	4.4
	2NU-DCGW11T304T	●															4.82	9.525	3.97	0.4	4.4
	2NU-DCGW11T308T	●															4.82	9.525	3.97	0.8	4.4
	T-2NU-DCGW11T304	●															4.82	9.525	3.97	0.4	4.4
	4NU-SCGW09T304																9.525	3.97	0.4	4.4	
	4NU-SCGW09T308																9.525	3.97	0.8	4.4	
	4NU-SCGW09T312																9.525	3.97	1.2	4.4	
	4NU-SCGW09T304F																9.525	3.97	0.4	4.4	
	4NU-SCGW09T308F																9.525	3.97	0.8	4.4	
	4NU-SCGW09T312F																9.525	3.97	1.2	4.4	
	4NU-SCGW09T304T																9.525	3.97	0.4	4.4	
	4NU-SCGW09T308T																9.525	3.97	0.8	4.4	
	4NU-SCGW09T312T																9.525	3.97	1.2	4.4	
	3NU-TCGW090204	●															1.62	5.56	2.38	0.4	2.5
	3NU-TCGW090204F	●															1.62	5.56	2.38	0.4	2.5
	3NU-TCGW090204T	●															1.62	5.56	2.38	0.4	2.5

Geomethy	Designation	Coating material				Non-coating material										weight	Measurement (mm)				
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410	KB420		KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)	Ød (Hole size)
	3NU-TPGW110304		●	●													2.3	6.35	3.18	0.4	3.4
	3NU-TPGW110308		●	●													2.3	6.35	3.18	0.8	3.4
	3NU-TPGW110304F		●														2.3	6.35	3.18	0.4	3.4
	3NU-TPGW110308F		●														2.3	6.35	3.18	0.8	3.4
	3NU-TPGW110304T		●														2.3	6.35	3.18	0.4	3.4
	3NU-TPGW110308T		●														2.3	6.35	3.18	0.8	3.4
	3NU-TPGN110304																2.3	6.35	3.18	0.4	
	3NU-TPGN110308																2.3	6.35	3.18	0.8	
	3NU-TPGN110304F																2.3	6.35	3.18	0.4	
	3NU-TPGN110308F																2.3	6.35	3.18	0.8	
	3NU-TPGN110304T																2.3	6.35	3.18	0.4	
	3NU-TPGN110304T																2.3	6.35	3.18	0.4	
	3NU-TPGN110308T		●	●													2.3	6.35	3.18	0.8	
	3NU-TPGN160304		●	●													4.8	9.525	3.18	0.4	
	3NU-TPGN160308		●	●													4.8	9.525	3.18	0.8	
	3NU-TPGN160304F																4.8	9.525	3.18	0.4	
	3NU-TPGN160308F																4.8	9.525	3.18	0.8	
	3NU-TPGN160304T																4.8	9.525	3.18	0.4	
	3NU-TPGN160308T																4.8	9.525	3.18	0.8	
		3NU-TPGB110304		●														6.35	3.18	0.4	3.4
3NU-TPGB110308			●														6.35	3.18	0.8	3.4	
3NU-TPGB110304F			●														6.35	3.18	0.4	3.4	
3NU-TPGB110308F			●														6.35	3.18	0.8	3.4	
3NU-TPGB110304T			●														6.35	3.18	0.4	3.4	
3NU-TPGB110308T			●														6.35	3.18	0.8	3.4	
	2NU-VBGW110304																8.61	6.35	3.18	0.4	2.8
	2NU-VBGW110308																8.61	6.35	3.18	0.8	2.8
	2NU-VBGW110304F																8.61	6.35	3.18	0.4	2.8
	2NU-VBGW110308F																8.61	6.35	3.18	0.8	2.8
	2NU-VBGW110304T																8.61	6.35	3.18	0.4	2.8
	2NU-VBGW110308T																8.61	6.35	3.18	0.8	2.8
	2NU-VBGW160404		●	●				●									8.61	9.525	4.76	0.4	4.4
	2NU-VBGW160408		●	●													8.61	9.525	4.76	0.8	4.4
	2NU-VBGW160404F		●														8.61	9.525	4.76	0.4	4.4
	2NU-VBGW160408F		●														8.61	9.525	4.76	0.8	4.4
	2NU-VBGW160404T		●														8.61	9.525	4.76	0.4	4.4
	2NU-VBGW160408T		●														8.61	9.525	4.76	0.8	4.4
	2NU-VCGW160404		●	●													8.61	9.525	4.76	0.4	4.4
	2NU-VCGW160408		●	●													8.61	9.525	4.76	0.8	4.4
	2NU-VCGW160404F		●														8.61	9.525	4.76	0.4	4.4
	2NU-VCGW160408F		●														8.61	9.525	4.76	0.8	4.4
	2NU-VCGW160404T		●														8.61	9.525	4.76	0.4	4.4
	2NU-VCGW160408T		●														8.61	9.525	4.76	0.8	4.4
	T-2NU-VCGW160408																8.61	9.525	4.76	0.8	4.4

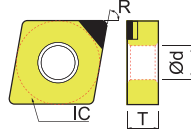
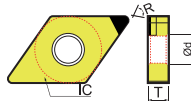
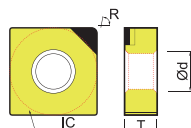
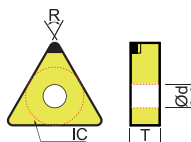
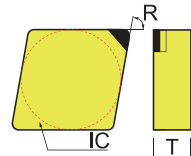
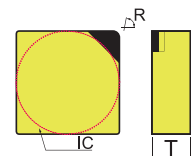
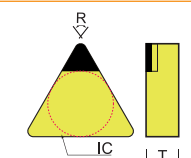
※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomethy	Designation	Coating material				Non-coating material								weight	Measurement (mm)						
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400		KB410	KB420	KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)	Ød (Hole size)
	NU-CNMA120404							●									9.89	12.7	4.76	0.4	5.16
	NU-CNMA120408							●		●			●	●			9.89	12.7	4.76	0.8	5.16
	NU-CNMA120412							●									9.89	12.7	4.76	1.2	5.16
	NU-DNMA150404							●									12.88	12.7	4.76	0.4	5.16
	NU-DNMA150408							●									12.88	12.7	4.76	0.8	5.16
	NU-DNMA150412																12.88	12.7	4.76	1.2	5.16
	NU-DNMA150604T														●		12.88	12.7	6.35	0.4	5.16
	NU-DNMA150608							●									12.88	12.7	6.35	0.8	5.16
	NU-SNMA120404																9.88	12.7	4.76	0.4	5.16
	NU-SNMA120408																9.88	12.7	4.76	0.8	5.16
	NU-SNMA120412																9.88	12.7	4.76	1.2	5.16
	NU-TNMA160404																7.19	9.525	4.76	0.4	3.81
	NU-TNMA160408							●									7.19	9.525	4.76	0.8	3.81
	NU-TNMA160412																7.19	9.525	4.76	1.2	3.81
	NU-VNMA160404							●									10.18	9.525	4.76	0.4	3.81
	NU-VNMA160408																10.18	9.525	4.76	0.8	3.81
	NU-VNMA160412																10.18	9.525	4.76	1.2	3.81
	NU-CCMW060202							●									10.18	6.35	2.38	0.2	2.8
	NU-CCMW060204							●									10.18	6.35	2.38	0.4	2.8
	NU-CCMW060208																10.18	6.35	2.38	0.8	2.8
	NU-CCMW09T302																4.62	9.525	3.97	0.2	4.4
	NU-CCMW09T304							●					●				4.62	9.525	3.97	0.4	4.4
	NU-CCMW09T308							●					●				4.62	9.525	3.97	0.8	4.4
	NU-CCGW060202							●									6.35	2.38	0.2	2.8	
	NU-CCGW060204							●									6.35	2.38	0.4	2.8	
	NU-CPMB080204																7.94	2.38	0.4	3.4	
	NU-CPMB080208																7.94	2.38	0.8	3.4	
	NU-CPMB090304																9.525	3.18	0.4	4.4	
	NU-CPMB090308																9.525	3.18	0.8	4.4	
	NU-DCMW070202							●						●			6.35	2.38	0.2	2.38	
	NU-DCMW070204							●						●			6.35	2.38	0.4	2.38	
	NU-DCMW070208																4.99	6.35	2.38	0.8	2.38
	NU-DCMW11T302							●									4.99	9.525	3.97	0.2	4.4
	NU-DCMW11T304							●						●			4.99	9.525	3.97	0.4	4.4
	NU-DCMW11T308							●									4.99	9.525	3.97	0.8	4.4
	NU-DCGW11T304							●									9.525	3.97	0.4		

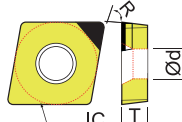
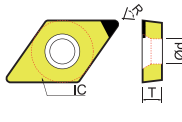
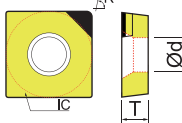
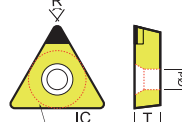
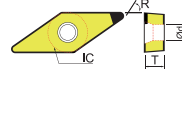
※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomechy	Designation	Coating material				Non-coating material										weight	Measurement (mm)					
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410	KB420		KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)	Ød (Hole size)	
	NU-TCGW090204																1.62	5.56	2.38	0.4	2.5	
	NU-TCGW090208																	1.62	5.56	2.38	0.8	2.5
	NU-TCGW110202																	2.3	6.35	2.38	0.2	2.8
	NU-TCGW110204																	2.3	6.35	2.38	0.4	2.8
	NU-TCGW110208																	2.3	6.35	2.38	0.8	2.8
	NU-TCGW16T304																	5.5	9.525	3.97	0.4	4.3
	NU-TCGW16T308																	5.5	9.525	3.97	0.8	4.3
	NU-TPGW080202																	1.15	7.94	2.38	0.2	2.4
	NU-TPGW080204																	1.15	7.94	2.38	0.4	2.4
	NU-TPGW080208																	1.15	7.94	2.38	0.8	2.4
	NU-TPGW090204																		5.56	2.38	0.4	2.8
	NU-TPGW090208																		5.56	2.38	0.8	2.8
	NU-TPGW110302																	2.3	6.35	3.18	0.2	3.4
	NU-TPGW110304																	2.3	6.35	3.18	0.4	3.4
	NU-TPGW110308																	2.3	6.35	3.18	0.8	3.4
	NU-TPGW160404																		9.525	4.76	0.4	4.4
NU-TPGW160408																		9.525	4.76	0.8	4.4	
	NU-VBMW110202																	6.35	2.38	0.2	2.8	
	NU-VBMW110204																		6.35	2.38	0.4	2.8
	NU-VBMW110302																		6.35	4.76	0.2	2.8
	NU-VBMW110304																		6.35	4.76	0.4	2.8
	NU-VBMW110308																		6.35	4.76	0.8	2.8
	NU-VBMW160402																	8.91	12.7	4.76	0.2	4.4
	NU-VBMW160404																	8.91	12.7	4.76	0.4	4.4
	NU-VBMW160408																	8.91	12.7	4.76	0.8	4.4
	NU-VCMW110304																		6.35	3.18	0.4	2.8
	NU-VCMW110308																		6.35	3.18	0.8	2.8
	NU-VCMW160404																		12.7	4.76	0.4	4.4
	NU-VCMW160408																		12.7	4.76	0.8	4.4
NU-VCMW160412																		12.7	4.76	1.2	4.4	
	NU-SPGN090304																	9.525	3.18	0.4		
	NU-SPGN090308																	9.99	9.525	3.18	0.8	
	NU-SPGN120304																	9.99	12.7	3.18	0.4	
	NU-SPGN120308																	9.99	12.7	3.18	0.8	
	NU-SPGN120404																	9.99	12.7	3.18	0.4	
	NU-SPGN120408																		12.7	3.18	0.8	
	NU-TPGN110304																	2.3	6.35	3.18	0.4	
	NU-TPGN110308																	2.3	6.35	3.18	0.8	
	NU-TPGN160304																	4.8	9.525	3.18	0.4	
	NU-TPGN160308																	4.8	9.525	3.18	0.8	

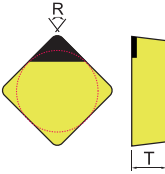
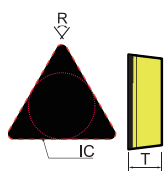
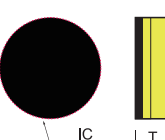
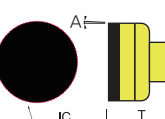
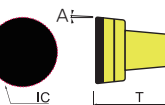
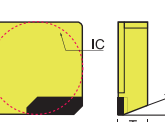
※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomethy	Designation	Coating material				Non-coating material										weight	Measurement (mm)				
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410	KB420		KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)	Ød (Hole size)
	CNMA120404							●									9.89	12.7	4.76	0.4	5.16
	CNMA120404W																9.89	12.7	4.76	0.4	5.16
	CNMA120408							●									9.89	12.7	4.76	0.8	5.16
	T-CNMA120408																9.89	12.7	4.76	0.8	5.16
	CNMA120408W																9.89	12.7	4.76	0.8	5.16
	CNMA120412							●									9.89	12.7	4.76	1.2	5.16
	CNMA120412W																9.89	12.7	4.76	1.2	5.16
	DNMA150404																12.88	12.7	4.76	0.4	5.16
	DNMA150408							●									12.88	12.7	4.76	0.8	5.16
	DNMA150412																12.88	12.7	4.76	1.2	5.16
	SNMA120404																9.88	12.7	4.76	0.4	5.16
	SNMA120408																9.88	12.7	4.76	0.8	5.16
	SNMA120412																9.88	12.7	4.76	1.2	5.16
	TNMA160404																7.19	9.525	4.76	0.4	3.81
	TNMA160408																7.19	9.525	4.76	0.8	3.81
	TNMA160412																7.19	9.525	4.76	1.2	3.81
	TNMA220404																12.95	12.7	4.76	0.4	5.16
	TNMA220408																12.95	12.7	4.76	0.8	5.16
	TNMA220412																12.95	12.7	4.76	1.2	5.16
	VNMA160404														●		9.525	4.76	0.4	3.81	
	VNMA160404																10.18	9.525	4.76	0.4	3.81
	T-VNMA160404																10.18	9.525	4.76	0.4	3.81
	VNMA160408																10.18	9.525	4.76	0.8	3.81
	VNMA160412																10.18	9.525	4.76	1.2	3.81
	CNGN090304																9.525	3.18	0.4		
	CNGN090308																9.525	3.18	0.8		
	CNGN090312																9.525	3.18	1.2		
	CNGN120404																12.7	4.76	0.4		
	CNGN120408																12.7	4.76	0.8		
	CNGN120412																12.7	4.76	1.2		
	SNGN090304																9.525	3.18	0.4		
	SNGN090308																9.525	3.18	0.8		
	SNGN090312																9.525	3.18	1.2		
	SNGN120404																12.7	4.76	0.4		
	SNGN120408																12.7	4.76	0.8		
	SNGN120412																12.7	4.76	1.2		
	TNGN160404																9.525	4.76	0.4		
	TNGN160408																9.525	4.76	0.8		
	TNGN160412																9.525	4.76	1.2		

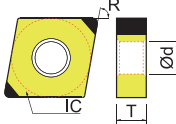
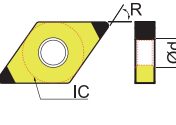
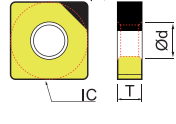
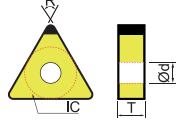
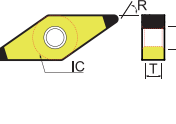
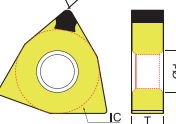
※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomechy	Designation	Coating material				Non-coating material										weight	Measurement (mm)					
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410	KB420		KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)	Ød (hole size)	
	CCMW09T304																4.51	4.5	9.525	3.97	4.4	
	CCMW09T308							●									4.51	4.5	9.525	3.97	4.4	
	CPGB080204																	4.5	7.94	2.38	3.4	
	CPGB080208																	4.5	7.94	2.38	3.4	
	CPGB090304																	4.5	9.525	3.18	4.4	
	CPGB090308																	4.5	9.525	3.18	4.4	
	CPGB090312																	4.4	9.525	3.18	4.4	
	CPGW080204																	4.5	7.94	2.38	4.4	
	CPGW080208																	4.5	7.94	2.38	4.4	
	DCMW070204																1.28	6.35	2.38	0.4	4.4	
	DCMW070208																	1.28	6.35	2.38	0.8	4.4
	DCMW070212																	1.28	6.35	2.38	1.2	4.4
	DCMW11T304							●										4.82	9.525	3.97	0.4	4.4
	DCMW11T308																	4.82	9.525	3.97	0.8	4.4
	DCMW11T312																	4.82	9.525	3.97	1.2	4.4
	DCGW11T304																	4.82	9.525	3.97	0.4	4.4
	T-DCGW11T304																	4.82	9.525	3.97	0.4	4.4
	DCGW11T308																	4.82	9.525	3.97	0.8	4.4
T-DCGW11T308																	4.82	9.525	3.97	0.8	4.4	
	SCMW09T304																	9.525	3.97	0.4	4.4	
	SCMW09T308																	9.525	3.97	0.8	4.4	
	SCMW09T312																	9.525	3.97	1.2	4.4	
	TCGW110204																	6.35	2.38	0.4	2.8	
	TCGW110208																	6.35	2.38	0.8	2.8	
	TCGW16T304																	9.525	3.97	0.4	4.3	
	TCGW16T308																	9.525	3.97	0.8	4.3	
	TCGW16T312																	9.525	3.97	1.2	4.3	
	VBMW110204																	6.35	2.38	0.4	2.8	
	VBMW110208																	6.35	2.38	0.8	2.8	
	VBMW110304																	6.35	3.18	0.4	2.8	
	VBMW110308																	6.35	3.18	0.8	2.8	
	VBMW160404							●									8.61	9.525	4.76	0.4	4.4	
	VBMW160408							●									8.61	9.525	4.76	0.8	4.4	
	VBMW160412																8.61	9.525	4.76	1.2	4.4	
	VCMW160404																8.61	9.525	4.76	0.4	4.4	
	VCMW160408																8.61	9.525	4.76	0.8	4.4	
	VCMW160412																8.61	9.525	4.76	1.2	4.4	

※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomethy	Designation	Coating material			Non-coating material										weight	Measurement (mm)				
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410		KB420	KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)
	SPGN090304																9.525	3.18	0.4	
	SPGN090308																9.525	3.18	0.8	
	SPGN090312																9.525	3.18	1.2	
	SPGN120304															9.99	12.7	3.18	0.4	
	SPGN120308															9.99	12.7	3.18	0.8	
	SPGN120312															9.99	12.7	3.18	1.2	
	TBGN060102-B																3.97	1.59	0.2	
	TBGN060104-B																3.97	1.59	0.4	
	TBGN060108-B																3.97	1.59	0.8	
	TPGN110304																6.35	3.18	0.4	
	TPGN110308																6.35	3.18	0.8	
	TPGN110312																6.35	3.18	1.2	
	TPGN160304														4.8	9.525	3.18	0.4		
	TPGN160308														4.8	9.525	3.18	0.8		
	TPGN160312														4.8	9.525	3.18	1.2		
	RNGN060300-B																12.7	4.76		
	RNGN090300-B																6.35	3.18		
	RNGN120400-B																9.525	3.18		
	RBG08-B																8	6.5		
	RBG10-B																10	9		
	RBG12-B																12	11		
	RBG16-B																16	13		
	RBG20-B																23	15		
	RBG26-B																26	15		
	RCGA0906MO																9	6.4		
	RTGN0508MO																5	7.5		
	RTGN0608MO																6	7.5		
	RTGN0711MO																7	11		
	RTGN0811MO																8	11		
	RTGN0914MO																9	14		
	RTGN1014MO																10	14		
	RTGN1214MO																12	14		
	SNEN1504ADTR																15.875	4.76		
	SNEN1504ADTL																15.875	4.76		
	SNEN1504DTR-W																15.875	4.76		
	SNEN1504DTL -W																15.875	4.76		

※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomethy	Designation	Coating material				Non-coating material										weight	Measurement (mm)			
		DNC100	DNC250	DNC350	DNC400	KB1000	KB2000	KB320	KB335	KB350	KB360	KB370	KB400	KB410	KB420		KB425	IC(Inscribed circle)	T(Thickness)	R(Nose R)
																				
	2NS-CNGA120408				●												12.7	4.76	0.8	5.16
																				
	2NS-DNGA150408				●												12.7	4.76	0.8	5.16
																				
	2NS-SNGA120408				●												12.7	4.76	0.8	5.16
																				
	2NS-TNGA160408				●												9.525	4.76	0.8	3.81
																				
	2NS-VNGA160408				●												9.525	4.76	0.8	3.81
																				
	2NS-WNGA080408				●												12.7	4.76	0.8	5.16

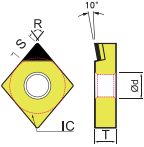
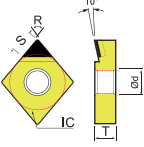
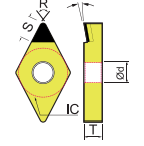
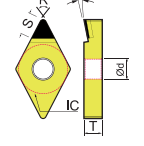
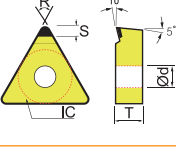
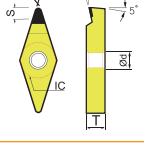
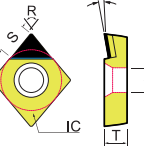
※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Type	Designation	Grade	Measurement (mm)			
		KB350	Whole length	Shank diameter	Shank width	Nose R
	BNBB 03R		60	3.0	2.4	0.2
	BNBB 035R		60	3.5	2.9	0.2
	BNBB 04R		60	4.0	3.4	0.2
	BNBB 045R		60	4.5	3.9	0.2
	BNBB 05R		80	5.0	4.4	0.2
	BNBB 055R		80	5.5	4.9	0.2
	BNBB 06R		80	6.0	5.4	0.2
	BNBB 065R		80	6.5	5.9	0.2
	BNBB 07R		100	7.0	6.4	0.2
	BNBB 075R		100	7.5	6.9	0.2
	BNBB 08R		100	8.0	7.4	0.2

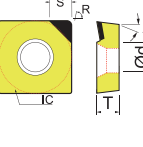
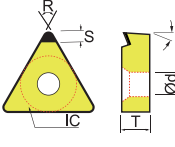
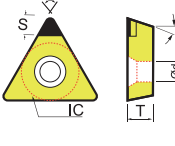
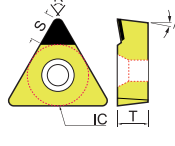
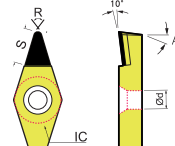
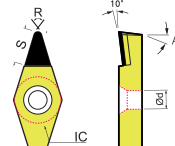
cBN Series

Geomethy	Designation	Grade			Measurement (mm)					Application holer
		KB320	KB335	KB420	Blade thickness	Blade length	Nose R	Whole length	Whole thickness	
	BNGNT0200L				2.0	4.0	0.2	25	6.0	BNGGL 2525-200
	BNGNT0200R				2.0	4.0	0.2	25	6.0	BNGGR 2525-200
	BNGNT0250L				2.5	4.0	0.2	25	6.0	BNGGL 2525-250
	BNGNT0250R				2.5	4.0	0.2	25	6.0	BNGGR 2525-250
	BNGNT0300L				3.0	5.0	0.4	25	6.0	BNGGL 2525-300
	BNGNT0300R				3.0	5.0	0.4	25	6.0	BNGGR 2525-300
	BNGNT0400L				4.0	6.0	0.4	26	6.0	BNGGL 2525-400
	BNGNT0400R				4.0	6.0	0.4	26	6.0	BNGGR 2525-400
	BNGNT0500L				5.0	6.0	0.4	26	6.0	BNGGL 2525-500
	BNGNT0500R				5.0	6.0	0.4	26	6.0	BNGGR 2525-500
	BNGNT0600L				6.0	7.0	0.4	27	6.0	BNGGL 2525-600
	BNGNT0600R				6.0	7.0	0.4	27	6.0	BNGGR 2525-600
	BNTT1020L				Pitch 0.039~0.079	0.13	25	2.0		BNGGL 2525-TT
	BNTT1020R				Pitch 0.039~0.079	0.13	25	2.0		BNGGR 2525-TT
	BNTT1530L				Pitch 0.059~0.118	0.13	25	2.0		BNGGL 2525-TT
	BNTT1530R				Pitch 0.059~0.118	0.13	25	2.0		BNGGR 2525-TT

※ - W : Wiper type ※ T - Designation consists of 10 units. ● : Stock

Geomethy	Designation	Grade				Measurement (mm)			
		DP90	DP150	DP200		IC (Inscribed circle)	T (Thickness)	R (Nose R)	Ød (Hole size)
	CNMM120404		●			12.7	4.76	0.4	5.16
	CNMM120408		●			12.7	4.76	0.8	5.16
	CNMM120412					12.7	4.76	1.2	5.16
	CNMX120404					12.7	4.76	0.4	5.16
	CNMX120408					12.7	4.76	0.8	5.16
	CNMX120412					12.7	4.76	1.2	5.16
	DNMM150404		●			12.7	4.76	0.4	5.16
	DNMM150408		●			12.7	4.76	0.8	5.16
	DNMM150412					12.7	4.76	1.2	5.16
	DNMX150404					12.7	4.76	0.4	5.16
	DNMX150408					12.7	4.76	0.8	5.16
	DNMX150412					12.7	4.76	1.2	5.16
	TNMX160404					9.525	4.76	0.4	3.81
	TNMX160408					9.525	4.76	0.8	3.81
	TNMX160412					9.525	4.76	1.2	3.81
	VNMX160404					9.525	4.76	0.4	3.81
	VNMX160408					9.525	4.76	0.8	3.81
	VNMX160412					9.525	4.76	1.2	3.81
	CCMT060202		●			6.35	2.38	0.2	3.81
	CCMT060204		●			6.35	2.38	0.4	3.81
	CCMT060208					6.35	2.38	0.8	3.81
	CCMT09T304		●			9.525	3.97	0.4	4.40
	CCMT09T308		●			9.525	3.97	0.8	4.40
	CCMT09T312					9.525	3.97	1.2	4.40
	CPMT080204					7.94	2.38	0.4	3.4
	CPMT080208					7.94	2.38	0.8	3.4
	CPMT080212					7.94	2.38	1.2	3.4
	CPMT090304					9.525	3.18	0.4	4.40
	CPMT090308					9.525	3.18	0.8	4.40
	CPMT090312					9.525	3.18	1.2	4.40
	CPMT080204					7.94	2.38	0.4	3.40
	CPMT080208					7.94	2.38	0.8	3.40
	CPMT080212					7.94	2.38	1.2	3.40

● : Stock ○ : Fade out item

Geomethy	Designation	Grade				Measurement (mm)			
		DP90	DP150	DP200		IC (Inscribed circle)	T (Thickness)	R (Nose R)	Ød (Hole size)
	DCMT070202		●			6.35	2.38	0.2	2.80
	DCMT070204		●			6.35	2.38	0.4	2.80
	DCMT070208					6.35	2.38	0.8	2.80
	DCMT11T302					9.525	3.97	0.2	4.40
	DCMT11T304		●			9.525	3.97	0.4	4.40
	DCMT11T308		●			9.525	3.97	0.8	4.40
	TCMT090201					5.56	2.38	0.1	2.50
	TCMT090202					5.56	2.38	0.2	2.50
	TCMT090204					5.56	2.38	0.4	2.50
	TCMT110201					6.35	2.38	0.1	2.80
	TCMT110202					6.35	2.38	0.2	2.80
	TCMT110204					6.35	2.38	0.4	2.80
	TBGW060102					3.97	1.59	0.2	2.80
	TBGW060104					3.97	1.59	0.4	2.80
	TPGB080204					6.35	2.38	0.4	2.40
	TPGB080208					6.35	2.38	0.8	2.40
	TPGB090204					5.56	2.38	0.4	2.50
	TPGB090208					5.56	2.38	0.8	2.50
	TPGB110304					6.35	3.18	0.4	3.40
	TPGB110308					6.35	3.18	0.8	3.40
	TPGW080202					6.35	2.38	0.2	2.40
	TPGW080204					6.35	2.38	0.4	2.40
	TPGW090204		●			5.56	2.38	0.4	2.5
	TPGW090208		●			5.56	2.38	0.8	2.5
	TPGW110302					6.35	3.18	0.2	3.40
	TPGW110304		●			6.35	3.18	0.4	3.40
	TPGW110308		●			6.35	3.18	0.8	3.40
	TPGW160404					9.525	4.76	0.4	3.81
	TPGW160408					9.525	4.76	0.8	3.81
	TPGT110302					6.35	3.18	0.2	3.40
	TPGT110304					6.35	3.18	0.4	3.40
						6.35	3.18		3.40
	VBMT110302					6.35	3.18	0.2	3.40
	VBMT110304		●			6.35	3.18	0.4	3.40
	VBMT110308		●			6.35	3.18	0.8	3.40
	VCMT110302					6.35	3.18	0.2	3.40
	VCMT110304		●			6.35	3.18	0.4	3.40
	VCMT110308		●			6.35	3.18	0.8	3.40
	VBMT160402					9.525	4.76	0.2	4.40
	VBMT160404		●			9.525	4.76	0.4	4.40
	VBMT160408		●			9.525	4.76	0.8	4.40
	VBMT160412		●			9.525	4.76	1.2	4.40
	VCMT160402					9.525	4.76	0.2	4.40

● : Stock ○ : Fade out item

insert (Negative/Positive)

PCD

OTHER

[illegible]

● : Stock ○ : Fade out item



TOOL MASTER	-----	206
HT HEIGHT TOUCH SETTER	-----	208
DOP DINE OPTICAL EDGE FINDER	---	208
DZH DINE Z AXIAL HEIGHT GAUGE	--	209
DZP Dine Z Axial Setting Height Gauge		209
SC SPINDLE CLEANER	-----	210
KCP	-----	210
TB	-----	211
BLANK TOOL (BLK)	-----	211
TAPER SIZE	-----	212
POSITIONING BLOCK	-----	220

TOOL MASTER QUADRA



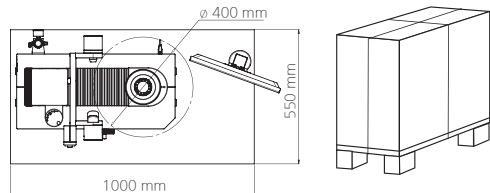
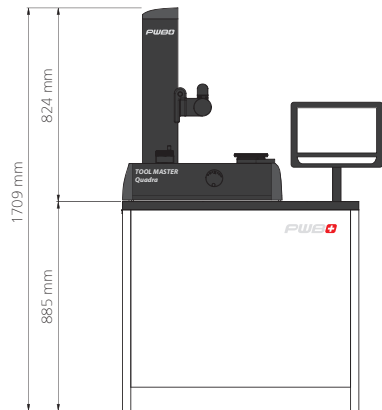
Features

- Fast and precise measuring in high quality
- Optimised setup times and machine downtime
- Cost-saving
- Increased tool life
- Manufactured with branded components
- Intuitive software and ergonomic hardware
- Economical
- Worldwide online-support
- Quality “Made in Switzerland”

TECHNICAL DATA

Type	Pneumatic clamping, practical design and ease of use
Measuring range Standard.($\varnothing$ mm / L mm) Max. ($\varnothing$ mm / L mm)	400 / 40 400 400 / 40 600
Axis xation	Pneumatics
Fine adjustment	Handwheel per axis
Tool mounting	Needle bearings or KV spindle with rotation clamp and vacuum feeder
Measuring procedure	Image processing with EyeRay® Hawk or Buzzard

EASY PACK



The base is designed such that the device is packaged and shipped in it saving space, reducing cost and environmentally friendly.
TOOL MASTER Quadra incl. base structure
L,W,H 118 x 70 x 151 cm ~ 200 kg in wooden crate

TOOL MASTER BASIC



Features

- Excellent quality-price ratio
- Measuring in high quality
- Manufactured with branded components
- Intuitive software and ergonomic hardware
- Economical
- Worldwide online-support
- Quality “Made in Switzerland”

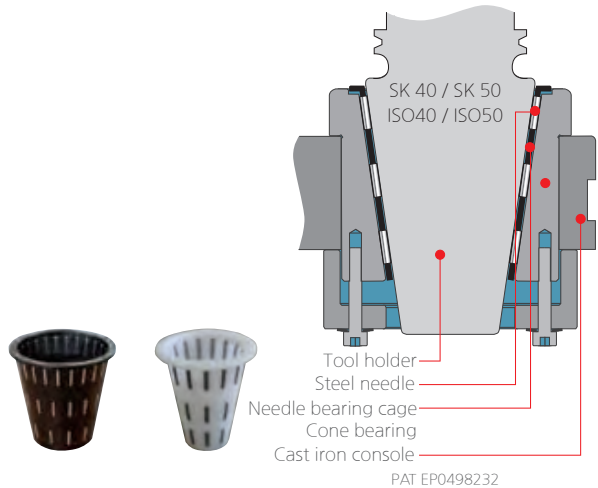
TECHNICAL DATA

Type	Pneumatic clamping, practical design and ease of use
Measuring range Standard.($\varnothing$ mm / L mm)	400 / 40 400
Axis xation	Pneumatics
Fine adjustment	Handwheel per axis
Tool mounting	Needle bearings or KV spindle with rotation clamp and vacuum feeder
Measuring procedure	Image processing with EyeRay® Hawk

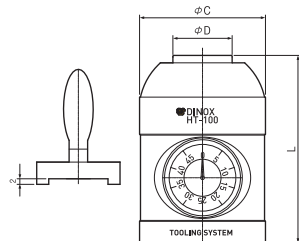
PWB NEEDLE BEARINGS

FOR HIGHEST REPEATABILITY

- Protection against damage of the ground cone
- Lower surface pressure than ball-bearings, thus less wear
- Higher centring forces than when using surface contact
- Oil and dirt remain in the cavities and have no influence on the measuring accuracy
- Integrated edge protection when changing tools
- Easy to clean
- No maintenance costs



HT HEIGHT TOUCH SETTER



Designation	ØD	ØC	L
HT - 100	32	68	100

Features

- End tool height gauge
- Position accuracy : ±0.003mm

DZH DINE Z AXIAL HEIGHT GAUGE



Designation	HEIGHT	G.W.WEIGHT KGS	LxWxH/UNIT:mm
DZH-50	50.00±0.005mm	1.2kgs	50X63X63

Features

- Cutter height gauge
- Height : 50.00±0.005mm
- Easy control
- Magnetic attachment

DOP DINE OPTICAL EDGE FINDER



Designation	G.W.WEIGHT KGS	ACCURACY	LxWxH/UNIT:mm
DOP-20B	0.3kgs	±0.005	158X20X10

Features

- Araming when contact

DZP DINE Z AXIAL SETTING HEIGHT GAUGE



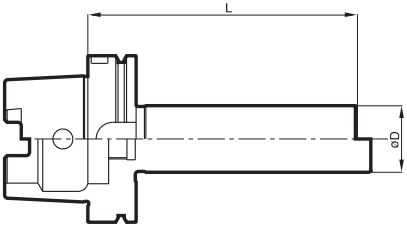
Designation	HEIGHT	G.W.WEIGHT KGS	LxWxH/UNIT:mm
DZP-100	±0.005	0.73kgs	100X50X50

Features

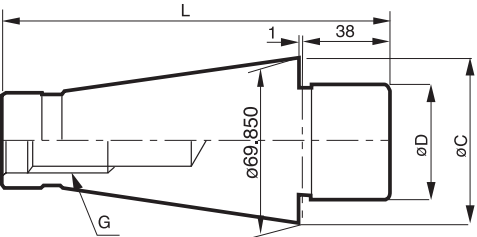
- Cutter height gauge
- Height : 50.00±0.005mm
- Easy control
- Magnetic attachment



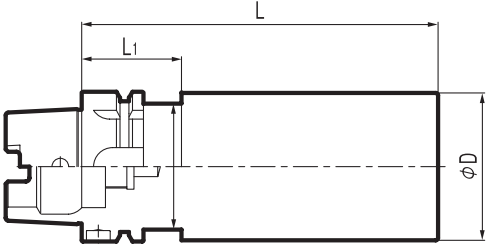
Designation	Taper	Weight
SC - BT30	BT30	0.08kg
SC - BT40	BT40	0.1kg
SC - BT50	BT50	0.2kg
SC - HSK50	HSK50	0.12kg
SC - HSK63	HSK63	0.13kg
SC - HSK100	HSK100	0.7kg



Designation	ØD	L
HSK63A-TB40-300	40	300
BTN30-TB30-200	30	200
BTN40-TB50-300	50	300
BTN50-TB50-300	50	300



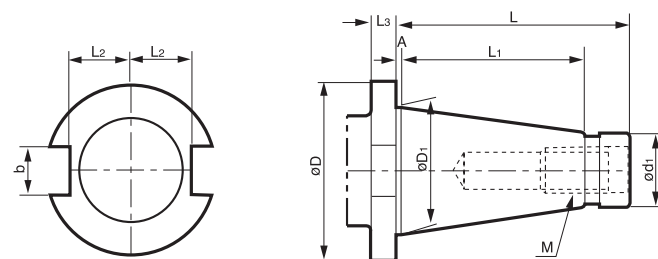
Designation	Taper	ØD	ØD	ØC	L	G
NTN 50 - KCP60	NT50	200(Over 8")	60	69.55	164.00	M24



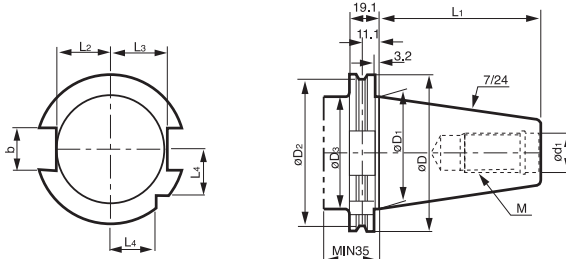
Designation	ØD	ØC	L	L1
HSK40A-BLK42-180	42	34	180	35
HSK50A-BLK52- 200	52	42	200	42
HSK63A-BLK63-150	63	52	150	42
HSK63A-BLK63-250	63	52	250	42
HSK63A-BLK82- 200	82	52	200	42
HSK100A-BLK102-150	102	85	150	45
HSK100A-BLK102-250	102	85	250	45
HSK100A-BLK126-200	126	85	200	45
BT30-BLK48-180	48	44	180	30
BT40-BLK63-150	63	61	150	35
BT40-BLK63-250	63	61	250	35
BT40-BLK82-200	82	61	200	35
BT50-BLK102-150	102	98	150	48
BT50-BLK102-250	102	98	250	48
BT50-BLK126-200	126	98	200	48

DIN 2080, JIS B 6101, ISO 297 : 1988(E)

DIN 69871-1 A/B, ISO 7388/1 : 1983(E)



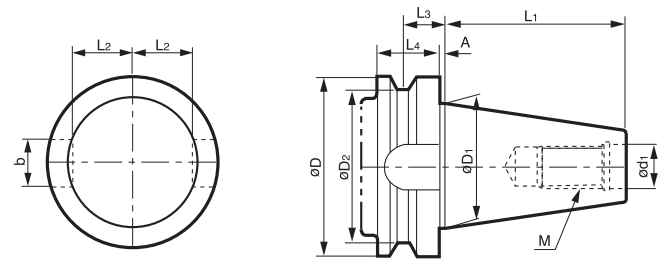
TAPER	ØD	ØD1	Ød1	L	L1	L2	L3	A	b	M
NT30	46	31.75	17.4	68.4	48.4	16.2	10	1.6	16.1	UNC 1/2-13
NT40	63	44.45	25.3	93.4	65.4	22.5	10	1.6	16.1	UNC 5/8 -11
NT50	100	69.85	39.6	126.8	101.8	35.3	14	3.2	25.7	UNC 1 - 8
NT60	155	107.95	60.2	206.8	161.8	60	15	3.2	25.7	UNC 1,1/4 -7



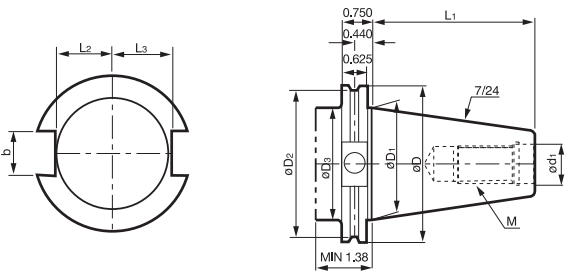
TAPER	ØD	ØD1	ØD2	ØD3	Ød1	L1	L2	L3	L4	b	M
SK30	50	31.75	44.3	45	13	47.8	16.4	19	15	16.1	M12 x 1.75
SK40	63.55	44.45	56.25	50	17	68.4	22.8	25	18.5	16.1	M16 x 2.0
SK50	97.5	69.85	91.25	80	25	101.75	35.5	37.7	30	25.7	M24 x 3.0

BOTTLE GRIP TAPER MAS403-BT

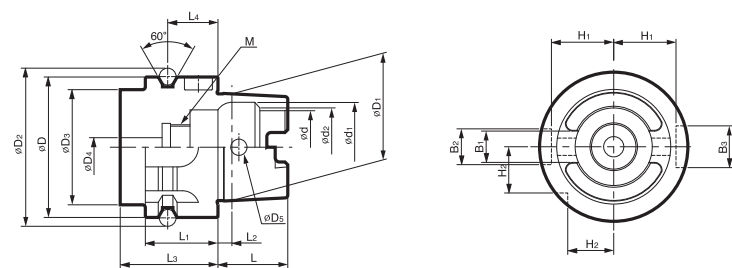
CAT SHANK (ANSI/ASME B5.50-1985)



TAPER	ØD	ØD1	ØD2	Ød1	L1	L2	L3	L4	A	b	M
BT30	46	31.75	38	12.5	48.4	16.3	13.6	20	2	16.1	M12 x 1.75
BT40	63	44.45	53	17	65.4	22.6	16.6	25	2	16.1	M16 x 2
BT50	100	69.85	85	25	101.8	35.4	23.2	35	3	25.7	M24 x 3
BT60	155	107.95	135	31	161.8	60.1	28.2	45	3	25.7	M30 x 3.5

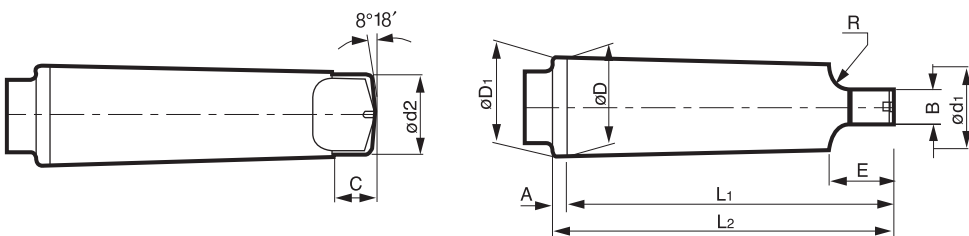


TAPER	ØD	ØD1	ØD2	ØD3	Ød1	L1	L2	L3	b	M
CAT30	1.812	1.250	1.531	1.250	0.516	1.875	0.640	0.735	0.645	UNC 0.500-13
CAT40	2.500	1.750	2.219	1.750	0.641	2.687	0.890	0.985	0.645	UNC 0.625-11
CAT50	3.875	2.750	3.594	2.750	1.031	4.000	1.390	1.485	1.020	UNC 1.000-8
CAT60	5.500	4.250	5.219	4.250	1.281	6.375	2.140	2.235	1.020	UNC 1.250-7



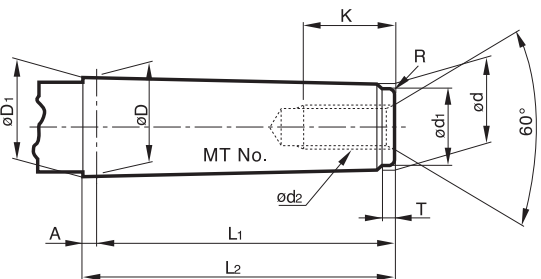
TAPER	ϕD	ϕD_1	ϕD_3	ϕD_2	ϕD_4	ϕD_5	L	L1	L2	L3	L4
HSK 40A	40	30	34	45	5.0	4.6	20	20	4.0	35	16
HSK 50A	50	38	42	59.3	6.8	6.0	25	26	5.0	42	18
HSK 63A	63	48	53	72.3	8.4	7.5	32	26	6.3	42	18
HSK100A	100	75	88	109.75	12.0	12.0	50	29	10.0	45	20

TAPER	ϕd	ϕd_1	ϕd_2	B1	ϕD_4	ϕD_5	H1	H2	M
HSK 40A	21	25.5	23	8.05	11	9	17.0	12.0	M12×1.0
HSK 50A	26	32.0	29	10.54	14	12	21.0	15.5	M16×1.0
HSK 63A	34	40.0	37	12.54	18	16	26.5	20.0	M18×1.0
HSK 100A	53	63.0	58	20.02	22	20	44.0	31.5	M24×1.5



TAPER	Taper	Taper Angle(α)	ϕD	A	ϕD_1	ϕd_1	L1	L2	ϕd_2	B	C	E	R	r
MT0	1/19.212	1°29'27"	9.045	3	9.201	6.104	56.5	59.5	6.0	3.9	6.5	10.5	4	1
MT1	1/20.047	1°25'43"	12.065	3.5	12.240	8.972	62.0	65.5	8.7	5.2	8.5	13.5	5	1.2
MT2	1/20.020	1°25'50"	17.780	5	18.030	14.034	75.0	80.0	13.5	6.3	10	16	6	1.6
MT3	1/19.922	1°26'16"	23.825	5	24.076	19.107	94.0	99.0	18.5	7.9	13	20	7	2
MT4	1/19.254	1°29'15"	31.267	6.5	31.605	25.164	117.5	124.0	24.5	11.9	16	24	8	2.5
MT5	1/19.002	1°30'26"	44.399	6.5	44.741	36.531	149.5	156.0	35.7	15.9	19	29	10	3
MT6	1/19.180	1°29'36"	63.348	8	63.765	52.399	210.0	218.0	51.0	19.0	27	40	13	4
MT7	1/19.231	1°29'22"	83.058	10	83.578	68.186	286.0	296.0	66.8	28.6	35	54	19	5

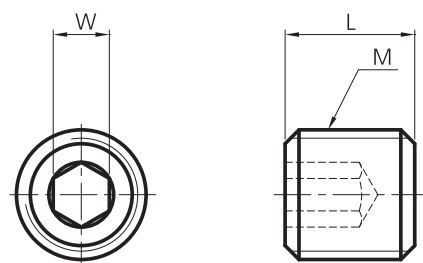
MORSE TAPER(SCREW TYPE)



TAPER	Taper	Taper Angle(α)	ϕD	A	ϕD_1	d	L1	L2	ϕd_1	d2	K	T	R
MT0	1/19.212	1°29'27"	9.045	3	9.201	6.442	50	53	6.4	-	-	4	0.2
MT1	1/20.047	1°25'43"	12.065	3.5	12.230	9.396	53.5	57	9.4	M6	16	5	0.2
MT2	1/20.020	1°25'50"	17.780	5	18.030	14.583	64	69	14.6	M10	24	5	0.2
MT3	1/19.922	1°26'16"	23.825	5	24.076	19.759	81	86	19.8	M12	28	7	0.6
MT4	1/19.254	1°29'15"	31.267	6.5	31.605	25.943	102.5	109	25.9	M16	32	9	1
MT5	1/19.002	1°30'26"	44.399	6.5	44.741	37.584	129.5	136	37.6	M20	40	9	2.5
MT6	1/19.180	1°29'36"	63.348	8	63.765	53.859	182	190	53.9	M24	50	12	4
MT7	1/19.231	1°29'22"	83.058	10	83.578	70.058	250	260	70.0	M33	80	18.5	5

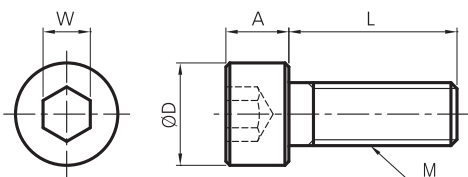
SPARE PARTS

SET SCREW(SQUARE BORING BAR)

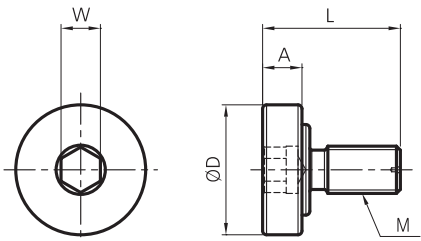


Designation	M	L	W
BTF0505	M5x0.8	5	2.5
BTF0606	M6x10	6	3
BTF0608	M6x1.0	8	3
BTF0808	M8x1.25	8	4
BTF0812	M8x1.25	12	4
BTF1010	M10x1.5	10	5
BTF1012	M10x1.5	12	5
BTF1016	M10x1.5	16	5
BTF1060	M10x1.5	60	5
BTF1212	M12x1.75	12	6
BTF1212-1.5	M12x1.5	12	6
BTF1414-1.5	M14x1.5	14	6
BTF1216	M12x1.75	16	6
BTF1220	M12x1.75	20	6
BTF1225	M12x1.75	25	6
BTF1230	M12x1.75	30	6
BTF1240	M12x1.75	40	6
BTF1616	M16x2.0	16	6
BTF1616-1.5	M16x1.5	16	8
BTF1624-1.5	M16x1.5	24	8
BTF1818-1.5	M18x1.5	18	8
BTF2020	M20x2.5	20	10
BTF2020-1.5	M20x1.5	20	10

CLAMP BOLT(FACE MILL ARBOR)



Designation	M	A	L	ØD	W
BX0310	M3x0.5	3	10	5.5	2.5
BX0412	M4x0.7	4	12	7	3
BX0415	M4x0.7	4	15	7	3
BX0515	M5x0.8	5	15	8.5	4
BX0516	M5x0.8	5	16	8.5	4
BX0616	M6x1.0	6	16	10	5
BX0620	M6x1.0	6	20	10	5
BX0625	M6x1.0	6	25	10	5
BX0630	M6x1.0	6	30	10	5
BX0820	M8x1.25	8	20	13	6
BX0825	M8x1.25	8	25	13	6
BX0830	M8x1.25	8	30	13	6
BX1020	M10x1.5	8	20	16	8
BX1030	M10x1.5	8	30	16	8
BX1035	M10x1.5	8	35	16	8
BX1230	M12x1.75	12	30	18	10
BX1235	M12x1.75	12	35	18	10
BX1640	M16x2.0	16	40	24	14
BX1645	M16x2.0	16	45	24	14

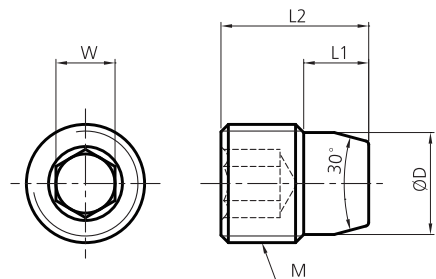


Designation	M	A	L	ØD	W
MBA-M8	M8x1.25	7	26	20	6
MBA-M10	M10x1.5	9	32	28	8
MBA-M12	M12x1.75	10	35	33	10
MBA-M16	M16x2.0	10	50	40	14
MBA-M20	M20x2.5	14	54	50	17
MBA-M24	M24x3.0	14	62	65	19

SPARE PARTS

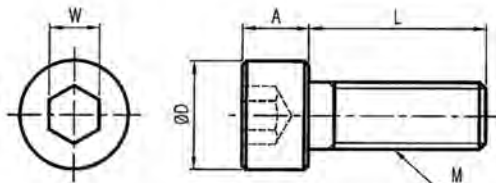
SPARE PARTS

TAPER SCREW(BASIC HOLDER)



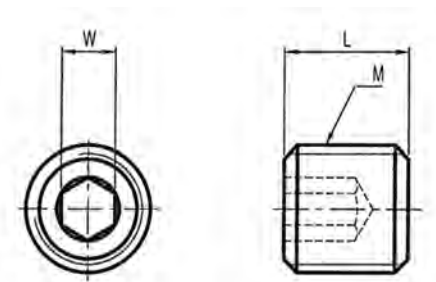
Designation	M	L1	L2	ØD	W
BTT0506F	M5x0.5	2.8	5.5	4.1	2.5
BTT0608F	M6x0.75	3.8	8	4.9	3
BTT0810F	M8x0.75	4.8	10	6.9	4
BTT1013F	M10x1.0	5.75	13	8.5	5
BTT1215F	M12x1.0	6.8	16	10.5	6
BTT1620F	M16x1.5	8.8	20	13.8	8
BTT1626F	M16x1.5	10.75	26	13.8	8
BTT1631F	M16x1.5	10.75	31	13.8	8

CLAMP BOLT(FBB BITE)



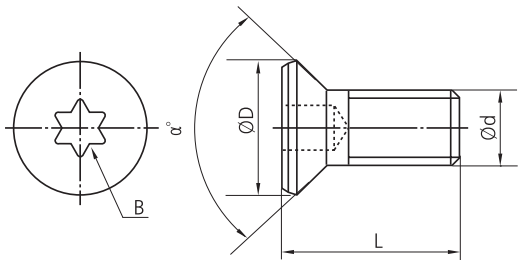
Designation	M	A	L	ØD	W
BXC0304	M3x0.5	2	5	5.5	2
BXC0405	M4x0.7	2.8	6	7	2.5
BXC0506	M5x0.8	3.5	6	8.5	3
BXC0610	M6x1.0	4	10	10	4
BXC0810	M8x1.25	5	10	13	5

SET SCREW(TBC/FBC)



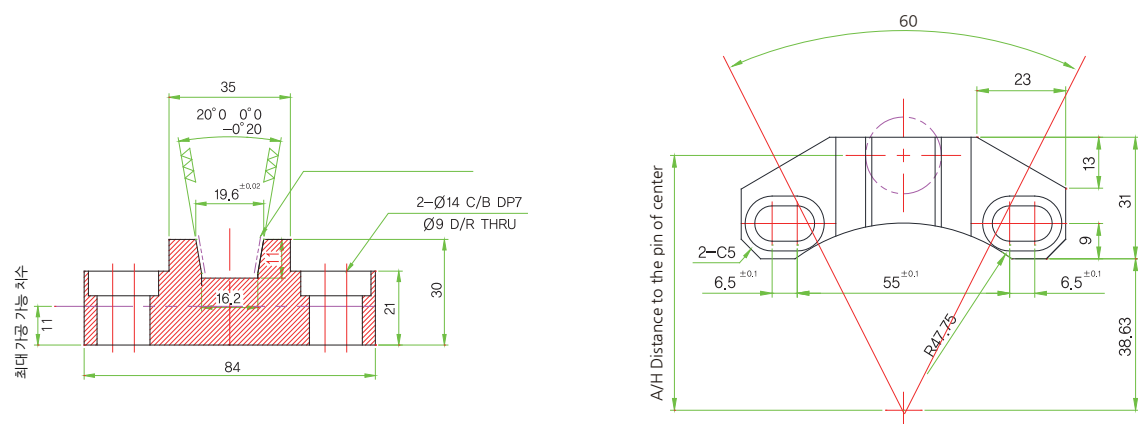
Designation	M	L1	W
BT0645	M6x1.0	45	3
BT0660	M6x1.0	60	3

INSERT SCREW



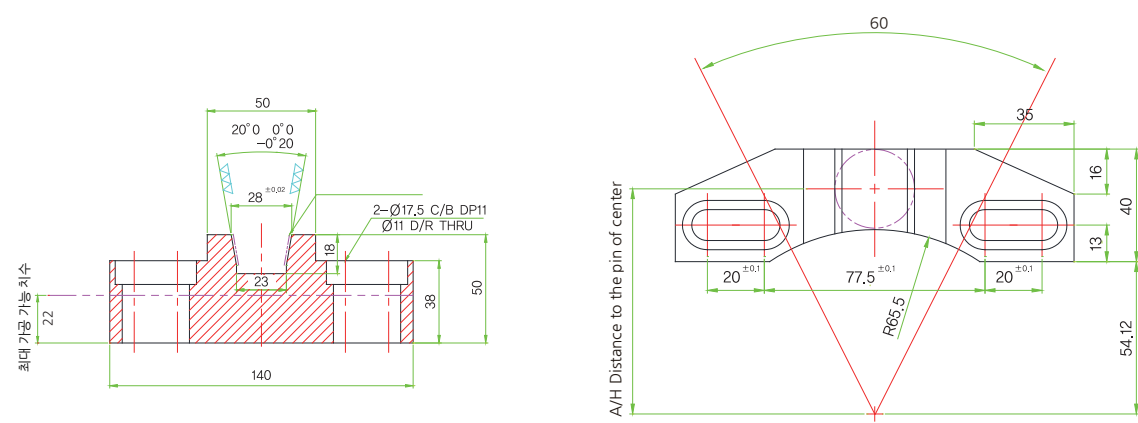
Designation	M	L	ØD	B	α°	(N·m)
BFTX0202A	2×0.4	3.0	2.7	T6	90	0.5
BFTX0204A	2×0.4	4.3	2.7	T6	90	0.5
BFTX0307A	3×0.5	6.8	4.3	T10	90	2.0
BFTX0410A	4×0.7	10.3	5.6	T15	90	3.4
BFTX02506	2.5×0.45	5.5	3.45	T8	60	1.5

General type-A (60°) - ISO40



- Min.Height of block : 19mm (from the upside)
- Basic bolt M8, washer required in case of under M6

General type-A (60°) - ISO50



- Min.Height of block : 28mm (from the upside)

NUMERAL ○				
A ○	○NS-CN□□-○○○○○○○	cBN		200
	○NS-DN□□-○○○○○○○	cBN		200
	○NS-TN□□-○○○○○○○	cBN		200
	○NS-VN□□-○○○○○○○	cBN		200
	○NS-WN□□-○○○○○○○	cBN		200
	○NU-CC□□-○○○○○○○	cBN		193
	○NU-CN□□-○○○○○○○	cBN		190
	○NU-DC□□-○○○○○○○	cBN		193
	○NU-DN□□-○○○○○○○	cBN		190
	○NU-SN□□-○○○○○○○	cBN		191
	○NU-TC□□-○○○○○○○	cBN		193
	○NU-TN□□-○○○○○○○	cBN		191
	○NU-TP□□-○○○○○○○	cBN		194
	○NU-VB□□-○○○○○○○	cBN		194
	○NU-VC□□-○○○○○○○	cBN		194
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	CN□□○○○○○○○	cBN		197
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