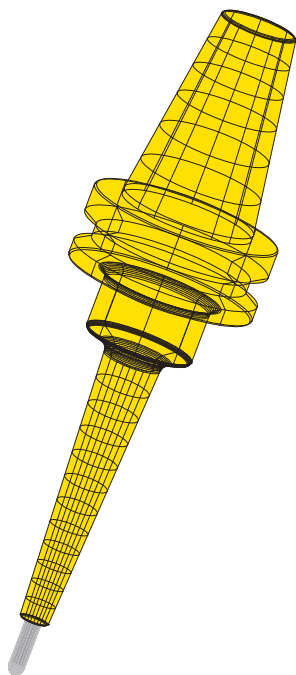


SHRINK-FIT HOLDER **SLIMLINE**



MST corporation

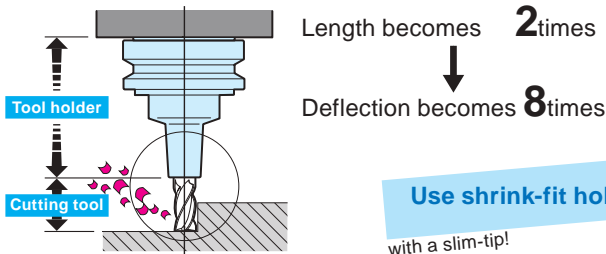
Vol. 2
1609



for High-accuracy, and High-efficiency machining

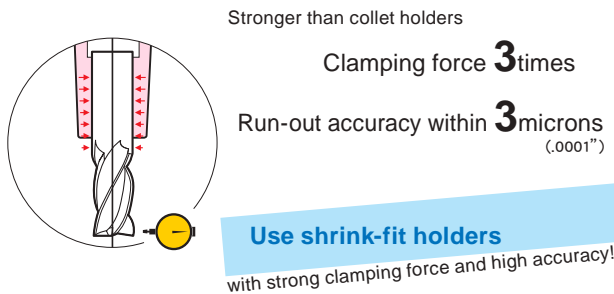
5 Points

1 The shortest As short as possible

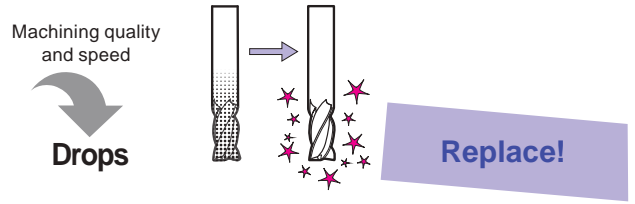


Deflection amount is proportional to projection length³.

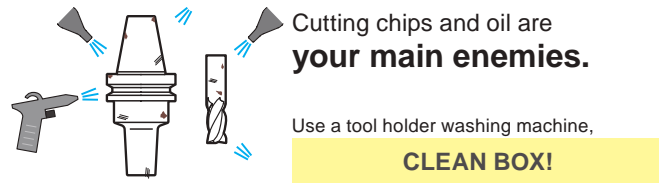
2 Selection Choose a tool holder that can clamp a cutting tool securely and with high accuracy.



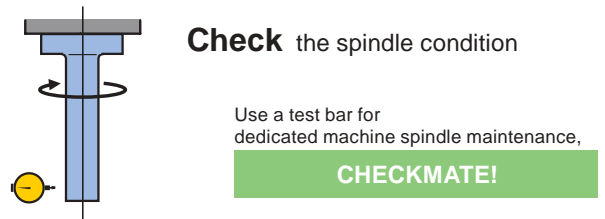
3 Quality Do not use worn cutting tools.



4 Cleanliness Clean your tool holders and cutting tools.



5 Accuracy Machine spindle run-out accuracy should be within 10 microns (.0004").



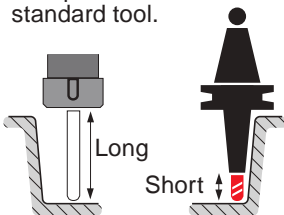
The SLIMLINE shrink-fit holder provides the perfect solution.

A simple chucking mechanism without any parts.

- Stable gripping. Gripping power 3 times.
- No gaps
- No parts that could become loose.
- Does not fall off even if vibrated.

Super-slim shape

- Allows the holder to enter a workpiece. Can be used with a standard tool.

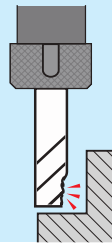


High accuracy

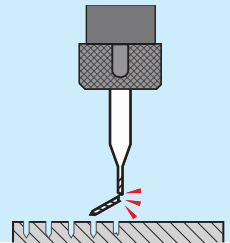
- Twice the tool life.
- Slim tools are also no problem.
- Anyone can use them...



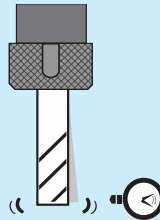
Short cutter life.



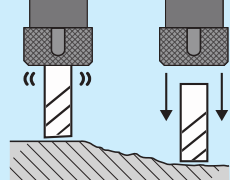
Small tools break soon.



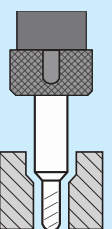
Cutter run-out adjustment is troublesome.



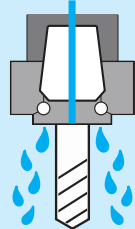
The end mill slips or falls off.



The applicable tools are special.



The coolant leaks.



SHRINK-FIT HOLDER
SLIMLINE

SLIMLINE can be used with all high-speed, high-precision machining centers.

SLIMLINE can be used in a wide variety of applications.

Fine-precision machining
High speed and high feed
High speed and heavy duty cutting
Simultaneous 5-axis machining
High quality machining
Linear motor drive

NAK81

Inconel Zirconia
HRC62° Ti-6Al-4V
SKD61 STAVAX
Quartz glass

MIKRON

HSM series / MILL S series / XSM series

WILLEM-MACODEL

401S2, 401PA / 308S/B, 408S2 / PA/B/MT/MTT, 508S/MT

Switzerland

France

FOREST-LINE

Aerostar, Aeromill, Minumac, Vstar, etc.

BROTHER
SPEEDIO

DMG MORI

HSC 30 linear, HSC 20 linear, NVD4000 DCG

MAKINO

MAG, V22/V33i, iQ300, J3

MAKINO J

J3

MITSUBISHI

μV1

MITSUI SEIKI

VL30

OKK

GR400

ROKU-ROKU

MEGA-SS Series/Android, MEGA, CEGA-SS Series

SODICK

UH430L/UH650L, TT1-400A, OPM250L

SUGINO

Xion- III/Xion- II-5AX, NSV9, V9

YASDA

YMC430

Japan



CINCINNATI MACHINE

SMART-t, MAXOR

HAAS AUTOMATION

VF, UMC

U.S.A.

Italy

FIDIA

D Range / G996 / HS664 / BSE

PARPAS

THST series



Germany

KERN

Micro, Evo, Pyramid Nano

OPS-INGERSOLL

V5/9, 550/650

ROEDERS

RXP, RXS, RHP, RXD

HERMLE

C series

CHIRON

Series08/12

DIGMA

HSC-Line, HSC-MP-Line

DMG

HSC series, ULTRASONIC20/30 linear

Medical

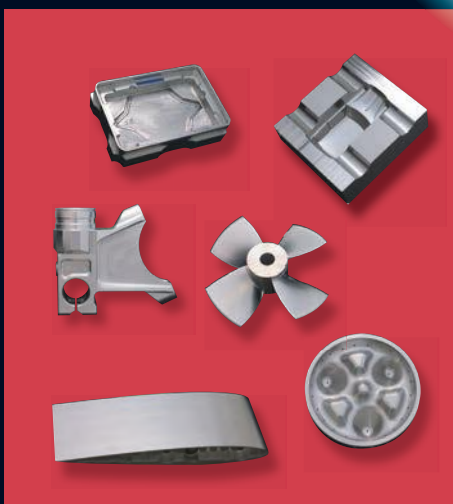
Optical communication

Aerospace


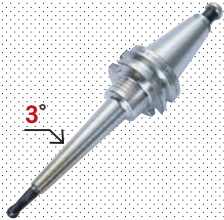
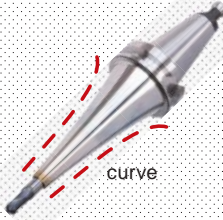
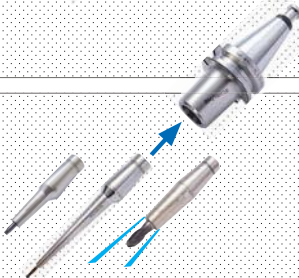




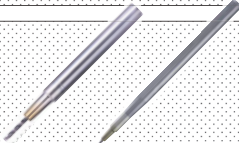


Car • Mobile

Fuel battery

Semiconductor device



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UNO ● Ultraprecise run-out accuracy, 1 micron		Product List
HYPER version ● Gripping force and rigidity strengthening type	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Short type</p> </div> <div style="text-align: center;">  <p>Heavy-duty type</p> </div> </div>	Product List
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RELIABLE TOOLING

MST's tooling is subject to its own MST's 4 precision standards: taper contact, roundness, surface roughness and heat treatment. These are more precise than JIS or MAS standards. We provide trustworthy products under strict quality control.

● **MST's 4 precision standards.**

1 Taper contact	%	90
2 Roundness	μm	0.8
3 Surface roughness	μm	0.6
4 Heat treatment	Material	SCM415
	Carburized depth	mm 0.8 ~ 1.0
	Quenching hardness	HRC 55° ± 2°



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MST's SHRINK-FIT HOLDER **SLIMLINE** is

a system to hold tools (carbide) firmly and accurately by heating and cooling the holder (steel).

It is different from the existing mechanism of chucking, and is a revolutionary holder that uses the science of material expansion and shrinkage. SLIMLINE is made of MST's exclusive material which is developed to shrink-fit (insert/remove tool) easily at low temperatures, 300°C average.

And, it has 1.6 times higher coefficient of thermal expansion than that of regular steel. Unlike conventional holders, SLIMLINE does not require any parts such as collets and nuts to hold tools. The simple mechanism can make the nose very thin,

even a thickness of 1.5mm, and achieve the **slimmest** design among all holders. It creates less work-piece interference and minimizes cutter projection in order to achieve stable and high-rigidity machining.

We also line up **4000** kinds to offer the most suitable holder design for various work-piece shapes. These are the benefits that only SLIMLINE can offer. SLIMLINE can be used widely for not only die and mold but also parts-machining industries.

We promise that SLIMLINE will demonstrate its outstanding capabilities in 5-axis, micro-precision, heavy-duty, and many kinds of machining in order to improve accuracy, extend tool life and reduce production cost.

PAT.

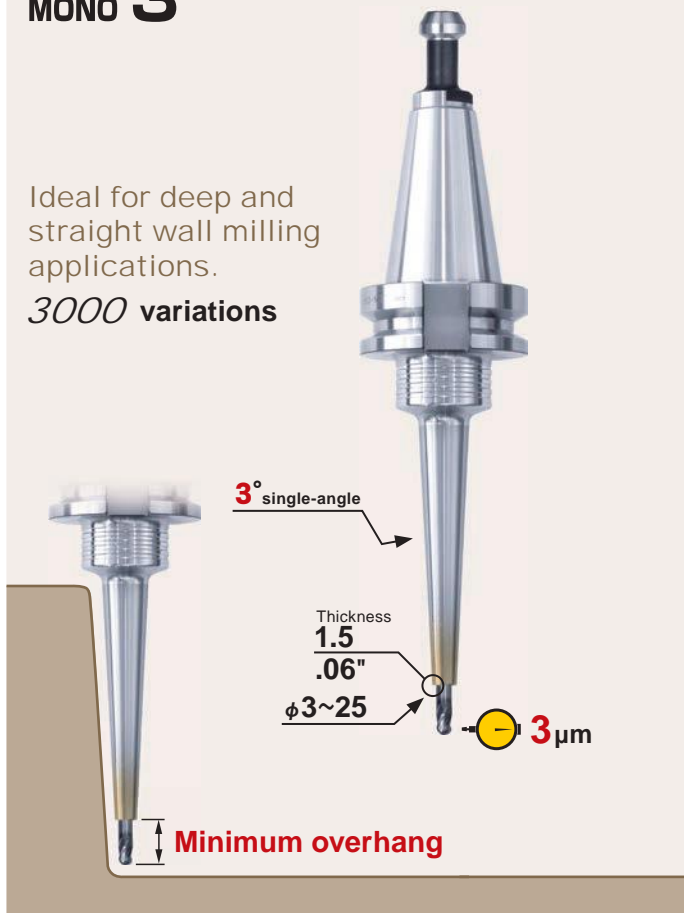
MONO SERIES → P. 14

Solid type

MONO 3°

Ideal for deep and straight wall milling applications.

3000 variations

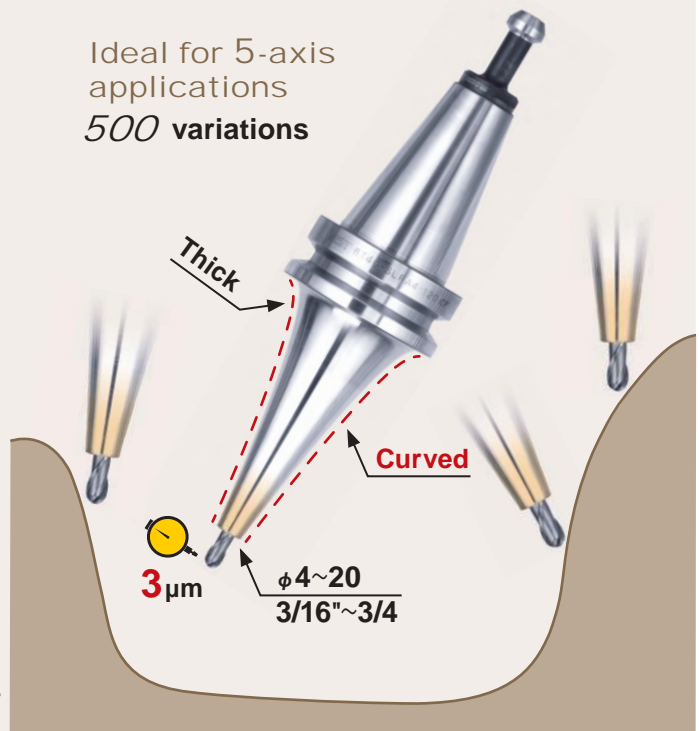


MONO CURVE

PAT.

Ideal for 5-axis applications

500 variations



- The material heatproof temperature is below 720°C (1,300°F) and shrinking temperature of SLIMLINE is a max. of 430°C (800°F). Therefore, SLIMLINE's material doesn't receive any material fatigue after scores of shrinking operation.



Shrink fitting at low temperature

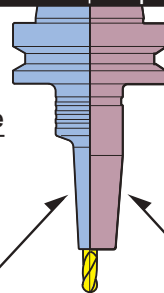
Shrink-fitting temperature
MAX. 430°C [800°F]

Tempered temperature
720°C [1300°F]

Special Material
17×10⁻⁶mm/°C

Holder material

MST Competitors



Tempered temperature
580°C [1000°F]

Die Steel (SKD)
11×10⁻⁶mm/°C

- The material heatproof temperature is 580°C (1,000°F) and shrinking temperature of standard shrink-fit holders is a max. 690°C (1,300°F). Therefore, the shrink-fit holder material is fatigued quickly after scores of shrinking operation.

Over Heating



Shrink-fitting temperature
MAX. 690°C [1300°F]

The material receives,
• Oxidation
• Contraction of a bore dia.
• Reducing hardness

1.6 times
Comparison of coefficient of thermal expansion rate

MST's shrink-fit holder, SLIMLINE has an amazing line-up for all kinds of applications!

4000 options



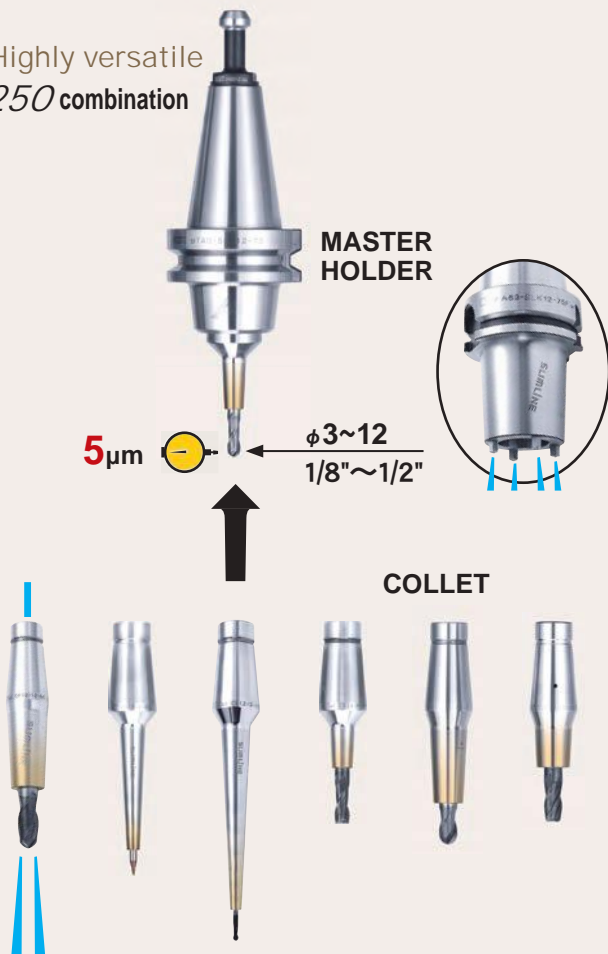
BT40 shank for dia. 6mm consists of 122 designs!



2 PIECE TYPE → P.73

Modular type

Highly versatile
250 combination



UNO → P.81

Solid type

Superior accuracy

PAT.



HYPER VERSION → P.83

Solid type

Heavy-duty endmill holder
with high clamping force



Z → P.87

Solid type

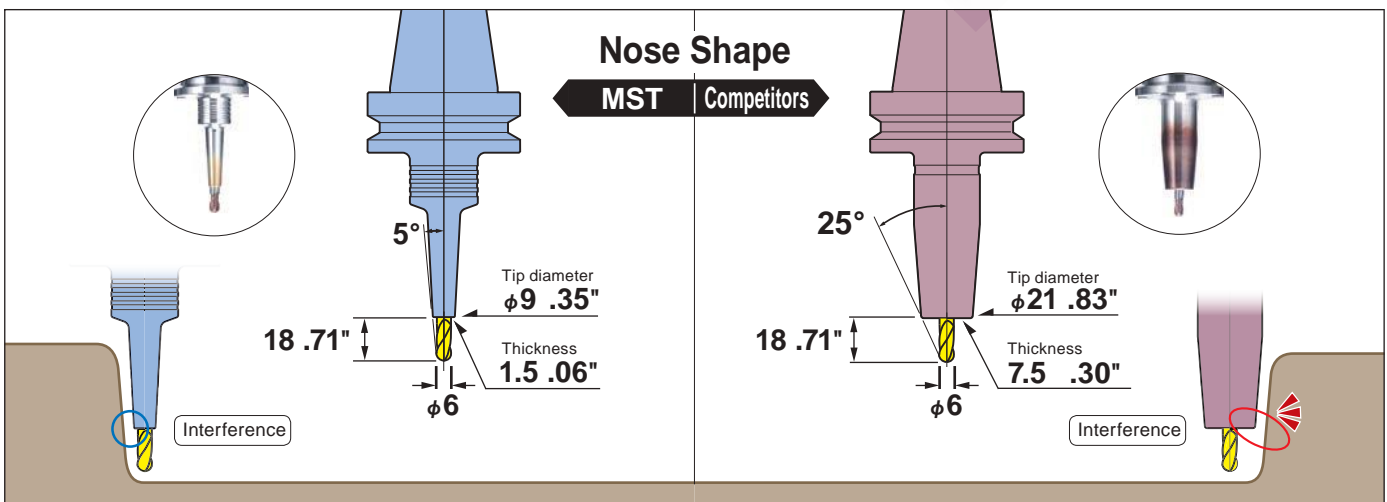
"Anti-pulling out and anti-slippage mechanism, Ultimate heavy-duty milling for hard-to-cut material"

PAT.



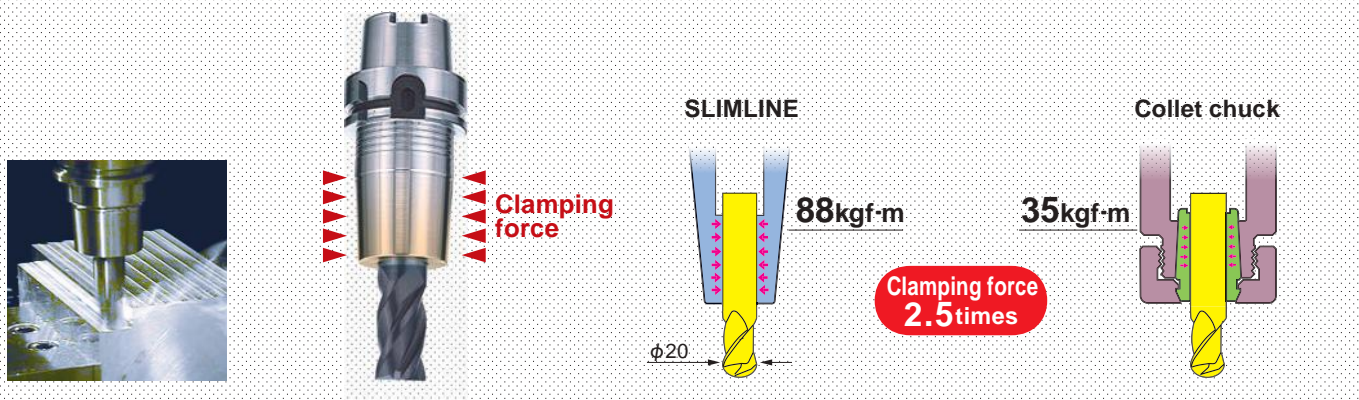
Nose Shape

MST Competitors



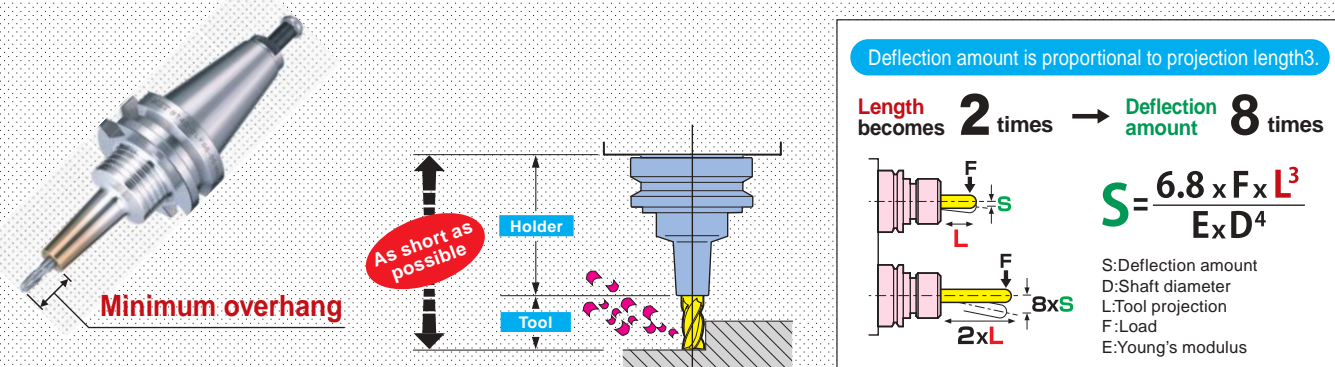
Feature
Shrink-fit Heater
MONO 3° MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS
Technical data

High clamping force 2.5 times greater clamping force (compare with a colletchuck)

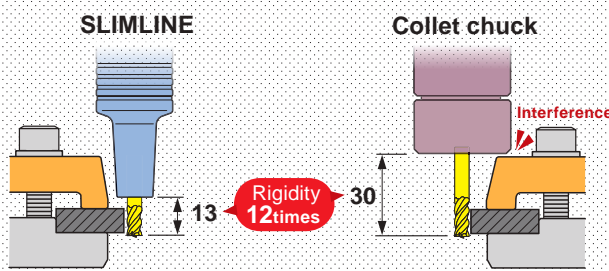
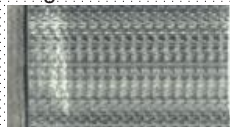


High rigidity Shortens cutter projection

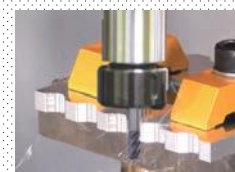
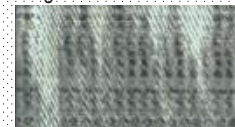
- Slim nose creates less interference with fixtures and cutter projection can be shortened. This can reduce cutter deflection and improve the cutter life and finishing surface.



Surface roughness $Rz = 2 \mu m$

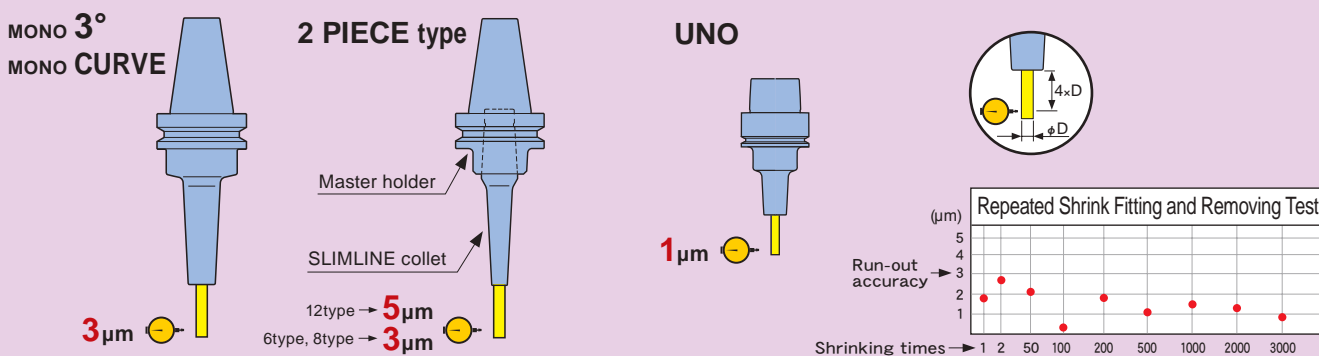


Surface roughness $Rz = 7.2 \mu m$



High rigidity Stable high run-out accuracy can be achieved at all times

- There are no tightening parts such as nuts and collets to hold cutters. The simple design sustains high accuracy chucking.



- Shrink-fitting temperature is comparatively low, about 300°C, which is safer for the materials.
Tools can be changed by the inexpensive and compact shrink-fit unit.

Hot-air Heater

- No limitation for holder design

3kW HEAT ROBO Baby3000S

1.2kW HEAT ROBO Baby1200S

1kW HEAT ROBO Baby1000

Induction Heater

- Clean and safe Induction Heater
- Desktop type

1.2kW HEAT ROBO DENJI 1200S

5kW HEAT ROBO DENJI 5000S

For COOLANT through

Withstanding pressure 15MPa

- The shrink-fit holder has a very simple configuration without a collet or a tightening nut. It is easily and completely compatible with through spindle coolant.

Pressure resistant 15MPa
CUTTER through
From the tip of cutter

Pressure resistant 15MPa
FLUSH through
From the tip of holder to the cutting edge

Pressure resistant 7MPa
NOZZLE through
From the nozzle

7MPa (NOZZLE through)

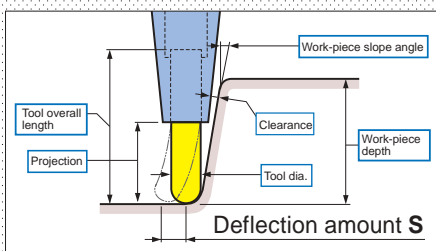
Most suitable for carbide coolant-thru drills!

3.175 3 4 5 6 7 8 9 10 11 12 16 20 25
Applicable for all drill shanks.

Rigidity calculation software

Holder automatic selection

- Automatically select optimum holders in the order of smaller deflection value S by inputting tool and work-piece information.



Enter your tool holder, cutting tool, and work-piece information.



Output DXF files. P. 118

順位	ホルダ名称	Deflection amount
1	BT40-SLSA6-150cv	3.2
2	BT40-SLSA6-120cv	4.8
3	BT40-SLSA6-180cv	5.2
4	BT40-SLSA6-125-M42	5.6
...

This system lists tool holders in descending order of rigidity.

USER Customization

Modifying outer-dimension

- When you have interference using a standard holder, you can customize it yourself.



P. 117
• MST can customize upon your request. There is a dimensional limitation for customizing.

Production improvement examples

examples 1 Improved tool design

- Reducing the overall length and diameter of the special cutting tool.

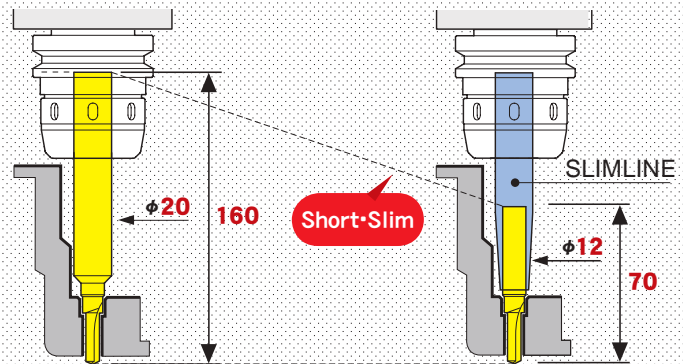


Clutch Housing



ADC12

Special tool cost
50% down
¥60,000 → ¥30,000



examples 2 Integrative tool

- SLIMLINE Solid type with the thinnest body design in the world allows the rigidity improvement tremendously at the straight wall application.

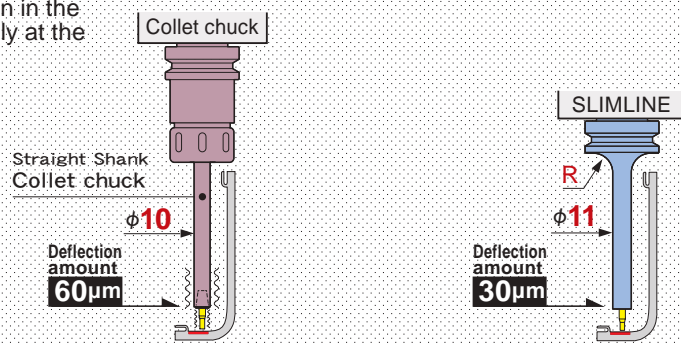


Smart phone



SUS304

Tool life
3 times longer



examples 3 Interference avoidance.

- Replacing the special long drill to the standard drill.

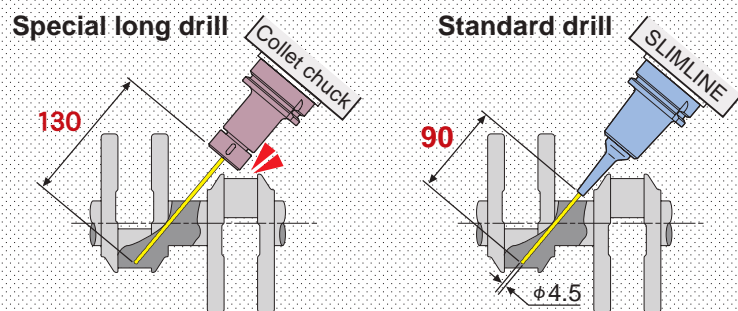


Crankshaft



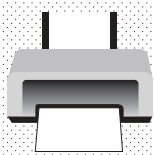
S53C

Tool cost **reduction**
¥23,000 → ¥12,500
Shortens machining time
1min. → 30sec.



examples 4 Small-size drilling

- SLIMLINE UNO allows dia. 0.07mm drilling.

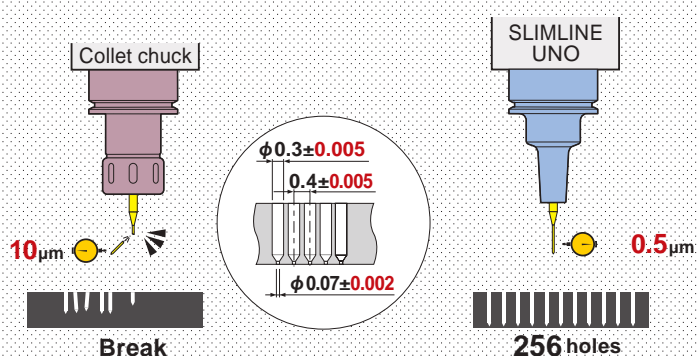


Printer head parts



SUS304

From impossible to
possible



Shrink-fit Heater **HEAT ROBO**

■ Specifications

Shrink-fit Heater	DENJI 電磁5000S	DENJI 電磁1200S	Baby3000S	Baby1200S	Baby1000
Spec.					
CODE	HRD-02S	HRD-01S	HRB-03S	HRB-02S	HRB-01
Heating method	Induction type		Hot air type		
Output power	5000 w	1200 w	3000 w	1200 w	1000 w
Cutter dia.	~φ25 [1"]	~φ12 [1/2"]	~φ25 [1"]	~φ12 [1/2"]	
Heating time	18 sec.		70 sec.	120 sec.	180 sec.

■ Compatibility table by holder type

Shrink-fit Heater	DENJI 電磁5000S	DENJI 電磁1200S	Baby3000S	Baby1200S	Baby1000
Holder type					
MONO series	○	▲	○	△	—
2 PIECE type	○	○	○	○	○
UNO	○	○	○	○	—
HYPER VERSION	○	—	○	—	—
Z	○	—	○	—	—
STRAIGHT arbor	○	▲	○	△	—

[○]: Available [-]: Not available [△]: Refer to size chart. [▲]: Requires recombinations of adaptors and bases. *Please verify compatibility for specific holders.

HOT AIR HEATER

Compatible with all holders without changing the nozzle.
Compact Affordable

Baby3000S

CODE	Area	Size (W×D×H)	Power (Single phase)	Kg lbs
HRB-03S	Japan	430×330×660mm	200V	9.5 (21)
-03S-230NA	North America		230V	
-03S-230EU	Europe			
-03S-230AS	Asia			

■ Std. Access.

- Timer • Heat-resistant gloves • Tweezers

■ Option

- Please choose parts on P.11-13

■ Note

- Factory compressed air (5kgf/cm²) is required. (consumption air volume: 245 l/min)
- Prepare an air tube (O.D:8mm) and a connection coupling.



Baby1200S



φ12 [1/2"]
Max. Cutter dia.
1200w
Heating 120 sec.
Cutter dia. φ6

CODE	Area	Size (W×D×H)	Power (Single phase)	Kg lbs
HRB-02S	Japan	370×260×590mm	100V	8.0 (18)
-02S-120NA	North America		120V	

■ Std. Access.

- Timer • Heat-resistant gloves • Tweezers

■ Option

- Please choose parts on P.11-13

■ Note

- Some holders cannot be used.

Baby1000



φ12 [1/2"]
Max. Cutter dia.
1000w
Heating 180 sec.
Cutter dia. φ6

CODE	Area	Size (W×D×H)	Power (Single phase)	Kg lbs
HRB-01	Japan	320×160×410mm	100V	3.5 (8)

■ Std. Access.

- Adapter (ADH-SLK) • Timer • Nozzles, 2 pieces (HNZ-17, HNZ-22)
- Heat-resistant gloves • Tweezers

■ Option

- Please choose parts on P.11-13

INDUCTION HEATER

Compact desktop type
Easy operation with touch panel

DENJI 電磁5000S

CODE	Size (W×D×H)	Power (3 phases)	Kg lbs (67)
HRD-02S	340×470×750mm	200-240V	30 (67)

Std. Access.

- Heat-resistant gloves
- Tweezers

Option

- Heating coil(HRD2-CL)
- Please choose parts on P.11-13

Note

- Use type HSB/HSC for cutter stopper.
- Compressed air required: 5Kg/cm² (air-consumption volume: 245l/min)
- The customer should prepare the following items : auxiliary parts including the air tube (O.D: 8mm.) an air filter and a coupler.

Heating Coil (Option)

Adapter (Option)

Base (Option)

Touch Panel

- Timer
- Coil selection
- Heating
- Cooling

Positioning Plate

A3 size

φ25 [1"]

Max. Cutter dia.

5000w

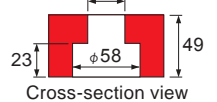
Heating 18 sec.

Cutter dia. φ6

Heating coil

CODE	Cutter dia.	Heating time	φC	H
HRD2-CL1-01	φ3~ 6 [1/8" ~ 1/4]	18 sec.	25	33
-CL2-01	φ7~12 [5/16" ~ 1/2]	28 sec.	35	42
-CL3-01	φ16, 20 [5/8", 3/4]		45	47
-CL4-01	φ25 [1"]	40 sec.	55	57
-CL5-01	•MONO 3°[SLRB-SLFB8/10/12/16-M22]	35 sec.	fig. 1	
-CL6-01	HYPER VERSION •Short type(ALL sizes) •Heavy-duty type [SLRB-SLFB12H/16H-M32]	40 sec.	60	47
-CL7-01	HYPER VERSION •Heavy-duty type [SLRB-SLFB20H/25H-M42]	60 sec.	70	67

fig. 1



Std. Access.

- Protection sheet for heating coil →P.13

Caution

- To protect the heating coil, don't heat a holder without using a coil protection sheet.
- When ordering, please note that holders for coil CL5, CL6, or CL7 cannot be heated by CL2, CL3, or CL4.

Note

- The coil protection sheet is a consumable part. Replace the coil protection sheet(option) when you see that it is colored or distorted by the heat.

DENJI 電磁1200S

CODE	Area	Size (W×D×H)	Power (Single phase)	Kg lbs (42)
HRD-01S	Japan	230×410×550mm	100V	14 (31)
HRD-01S-120NA	North America	230×410×550mm	120V	19 (42)
-230AS	Asia		230V	

Std. Access.

- Heating coil(HRD-CL)
- Heat-resistant gloves
- Tweezers

Option

- Please choose parts on P.11-13

Note

- Use type HSB/HSC for cutter stopper.
- Compressed air required: 5Kg/cm² (air-consumption volume: 245l/min)
- The customer should prepare the following items : auxiliary parts including the air tube (O.D: 8mm.) an air filter and a coupler.
- A transformer is required in Europe.
Please consult MST about the details of the transformer.

Heating Coil (Std.access)

Adapter (Option)

Base (Option)

Touch Panel

- Timer
- Coil selection
- Heating
- Cooling

Positioning Plate

A4 size

φ12 [1/2"]

Max. Cutter dia.

1200w

Heating 18 sec.

Cutter dia. φ6

Heating coil

CODE	Cutter dia.	Heating time	φC
HRD-CL1-01	φ3~ 6 [φ 1/8" ~ 1/4]	18 sec.	18
-CL2-01	φ7~12 [φ 5/16" ~ 1/2]	33 sec.	28

Std. Access.

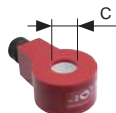
- Protection sheet for heating coil →P.13

Caution

- To protect the heating coil, don't heat a holder without using a coil protection sheet.

Note

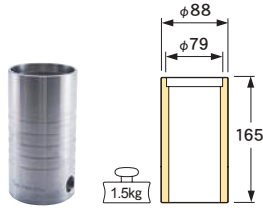
- The coil protection sheet is a consumable part. Replace the coil protection sheet(option) when you see that it is colored or distorted by the heat.



Option

■ Base

CODE
BAA-01



Examples of typical uses



■ Adapter

CODE	Dimensions	Holder		Shrink-Fit Heater model for Use					
		Type	Screw size	HRD-02S	HRD-01S	HRB-03S	HRB-02S	HRB-01	
ADH-SLK		2 PIECE type	6 type	M6	○	○	○	○	※ Adaptor (ADH-SLK) is included. No need to purchase base (BAA-01) for 2-piece collet type 12.
		SLIMLINE collet	8 type	M8					
			12 type	M10					
		STRAIGHT arbor	ST10	M6					
			ST12	M8					
		ST16/20/25	M10						
ADH-HSK25		MONO 3°	E25	○	△	○	△	※ Some holders cannot be used. Please refer to the dimensional sheet.	
-HSK32		MONO CURVE	E32						
-HSK40E		UNO	E40						
-HSK40A		HYPER VERSION	A40						
-HSK50		Z	A50 / E50 / F63						
-40			BT40 / A63 / F63					Available dimension C=Max. φ32 ※ M=22 has a max. diameter of 24 at C.	
-50			BT50 / A100						
			DIN40 / CAT. 40						
-15TR			15TR3						
-S20TR			RS20 / S20TR						
-BT30			BT30						
BAS-01		STRAIGHT arbor	ST16/20/25	M10	○	△	○	△	※ Some holders cannot be used. Please refer to the dimensional sheet.
			ST32	M16					
			ST42	M24					
BAS-02			Carbide Shank	ST○○C					Available dimension C=Max. φ32 ※ M=22 has a max. diameter of 24 at C.

○ : Available [—] : Not available △ : Restricted use

Option

■Cutter Stopper

Used as a stopper in the holder when shrink fitting or removing a cutting tool.

HSA type (Coil Spring Type)



CODE	φ D	Set Contents(Q'ty)
HSA-D [Ex.: HSA-6]	3, 3.175[1/8], 4, 5, 6, 7, 8, 9, 10, 11, 12, 16, 20, 25, [3/16", 1/4", 5/16", 3/8", 1/2"]	Each size 10 ea. /SET
-F	3, 4, 5, 6, 7, 8, 9, 10, 11, 12	1 ea., 10 pieces in total
-EF	3, 4, 5, 6, 8, 10, 12, 16, 20, 25	1 ea., 10 pieces in total

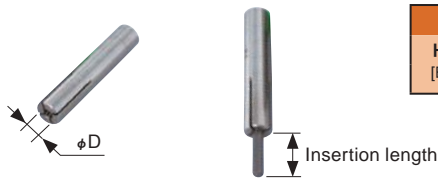
■Note
 • It cannot be used with HEAT ROBO DENJI.

HSB type (Plate Spring Type)

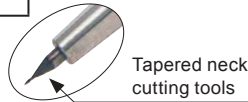


CODE	φ D
HSB-D [Ex.: HSB-3]	3, 3.175[1/8], 4, 6, 8, 10, 12, 16, 20, 25 [3/16", 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 1"]

HSC type (Slit Collet Type)



CODE	φ D
HSC-D [Ex.: HSC-3]	3, 3.175[1/8], 4, 6



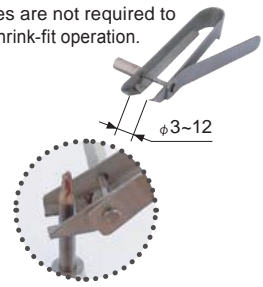
Insertion

Removing

Cutter Pliers

Heat-resistant gloves are not required to perform the simple shrink-fit operation.

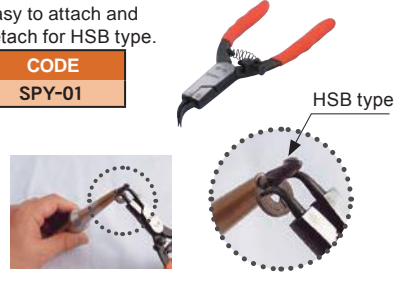
CODE
HPY-01



Stopper Pliers

Easy to attach and detach for HSB type.

CODE
SPY-01



Heat-Resistant Gloves

For additional order

CODE	NOTE
HTB-01	—
-01-R	Right Hand
-01-L	Left Hand



Cutter Tray

Cooling Tray for heated cutting tools after removal from a holder.

CODE
SDH-01

Size:170×170

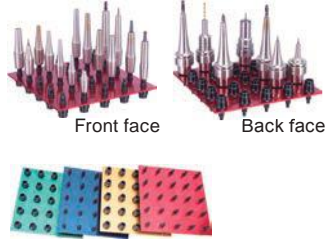


Holder Stand

The stand for the SLIMLINE collet, straight arbor and small shank holders (HSK-E25 and E32) is available in four colors, enabling simple color-coding.

CODE	Color	Front face	Back face	max.Q'ty
SDKT-RE	Red	SLIMLINE collet Straight arbor	Small shank holders (HSK-E25 / E32)	25 pieces each
-BL	Blue			
-GR	Green			
-GD	Gold			

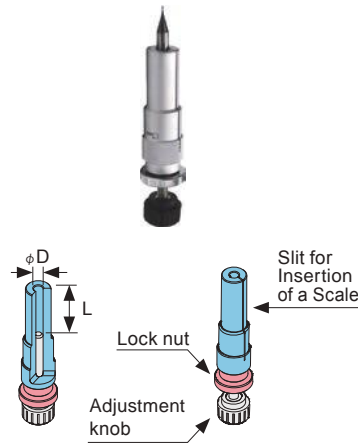
Size:190×190(mm)



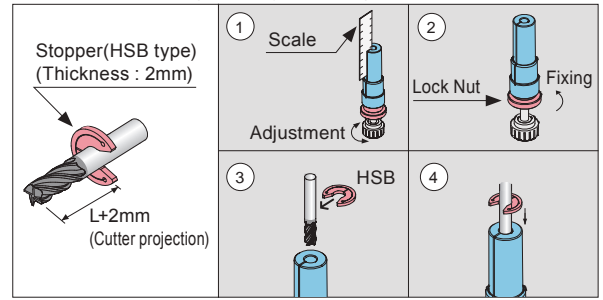
Cutter Adjuster

Adjustment simply made for cutting tool projection and insertion length.

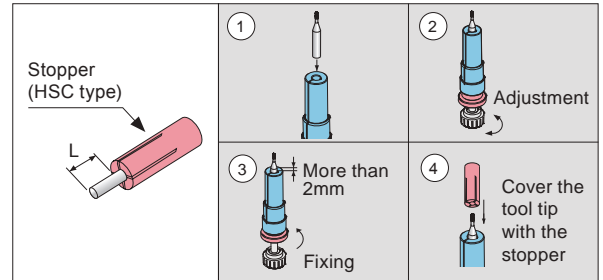
CODE	φ D	L
HAJ-3	3	10~30
-1/8	3.175 [1/8]	
-4	4	13~30
-3/16	[3/16]	
-6	6	19~45
-1/4	[1/4]	
-5/16	8 [5/16]	25~55
-3/8	10 [3/8]	31~ 70
-12	12	31~ 85
-1/2	[1/2]	
-5/8	16 [5/8]	33~ 90
-3/4	20 [3/4]	41~100
-25	25	46~100
-1"	[1"]	



Use HSB to set cutting tool projection length.



Use HSC to set cutting tool insertion length.



■Cleaning tools

Brush type

Nylon brushes for internal bores cleaning.

CODE	I.D
AQC-BR-SET	3 [1/8], 4 [3/16], 6 [1/4], 8 [5/16], 10 [3/8], 12 [1/2], 1 ea. 6 pieces in total
- 3-5	3 [1/8], 5 pcs.
- 4-5	4 [3/16], 5 pcs.
- 6-5	6 [1/4], 5 pcs.
- 8-5	8 [5/16], 5 pcs.
-10-5	10 [3/8], 5 pcs.
-12-5	12 [1/2], 5 pcs.

■Caution

- Do not use when holder is hot.



Rubber grinding stone type

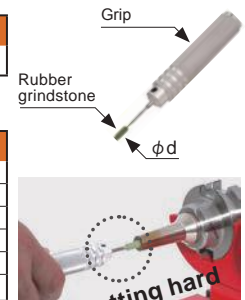
To eliminate strong oxidized film and burned-in dust and oil that have been generated in the internal bores.

Standard set

CODE	Note
CLT-GTA-01	1 ea. of below model

Parts

CODE	NAME	φd	Q'ty
CLT-GTA-GP	Grip	-	1 pc.
CLT-GTA 3-5	Rubber grind stone	3	5 pcs.
-GTA 4-5		4	5 pcs.
-GTA 6-5		6	5 pcs.
-GTA 8-5		8	5 pcs.
-GTA10-5		10	5 pcs.



When it is getting hard to insert cutters!

■Aqua Cool

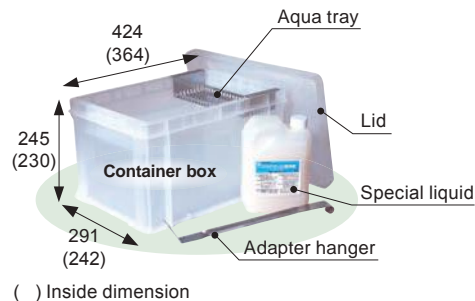
Aqua cool kit

Cooling kit for cooling SLIMLINE holders after shrink fitting or removing

CODE	Note
AQC-KIT-01	1 ea. for below model

Parts

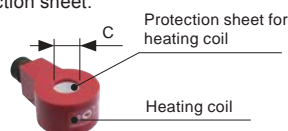
Name	CODE	Note
Special Liquid	AQC-EK-01-2	2ℓ of undiluted Solution, Use at a dilution ratio of 3%.
Aqua Tray	-AT-01	Drainer plate
Adapter Hanger	-AH-01	Hanger for lowering holders into liquid.
Container Box	CN -245	
Lid for Container Box	-FT	



Protection sheet for heating coil(For Induction Heater)

Don't heat holders without using a coil protection sheet.

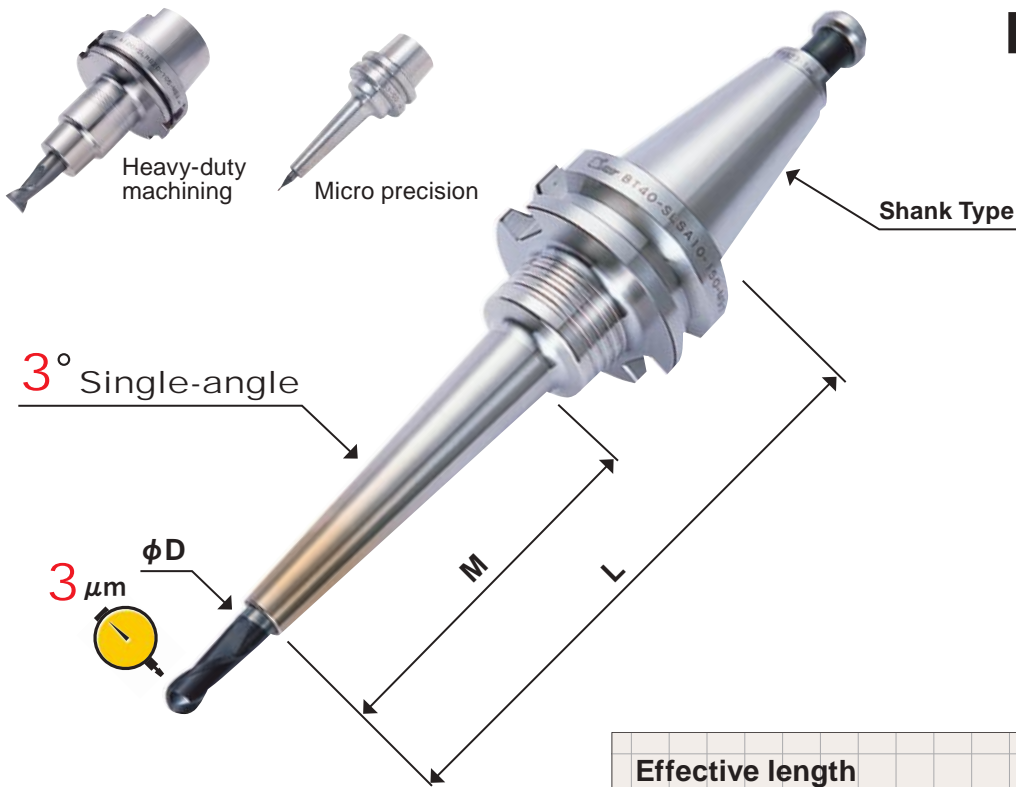
CODE	Heater model
HRD -DN-01 Coil No.	HEAT ROBO DENJI 1200S
HRD2-DN-01 Coil No.	HEAT ROBO DENJI 5000S



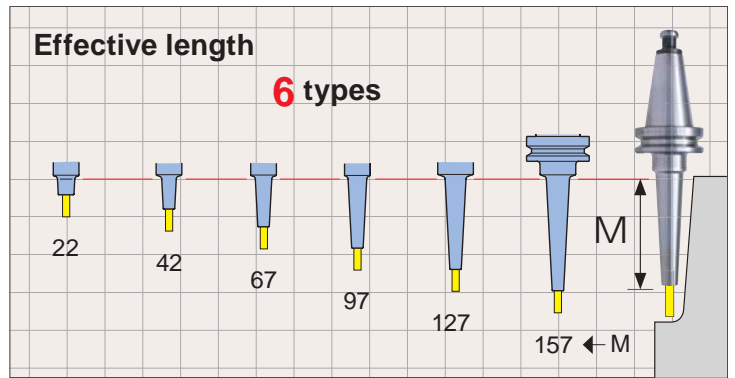
Ex. HRD-DN2-01

MONO SERIES

MONO 3°



3,000 variations



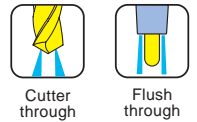
BT50 - SL SA 3 - 110 - M42

Shank Type SLIMLINE ϕD L Effective length

- DIN and CAT. shank products are available upon request.
- Inch. size I.D is available upon request.

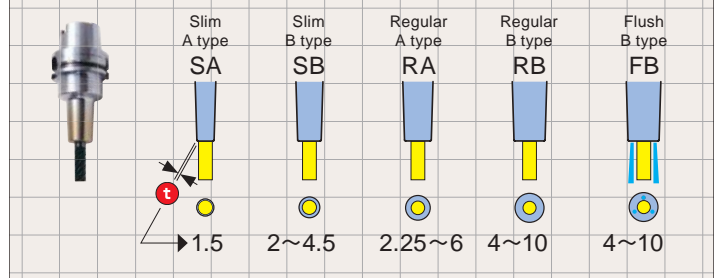
PAGE	
16	BT30
18	BT40
26	BT50
34	A40
36	A50
37	A63
47	A100
56	E25
57	E32
59	E40
61	E50
64	F63
69	15T
70	RS20
70	S20T

Coolant-through



Nose shape

Thickness t ...5 types



Feature

Shrink-fit Heater

MONO 3°
MONO CURVE

MONO Series

2PIECE type

UNO

HYPER
VERSION

Z

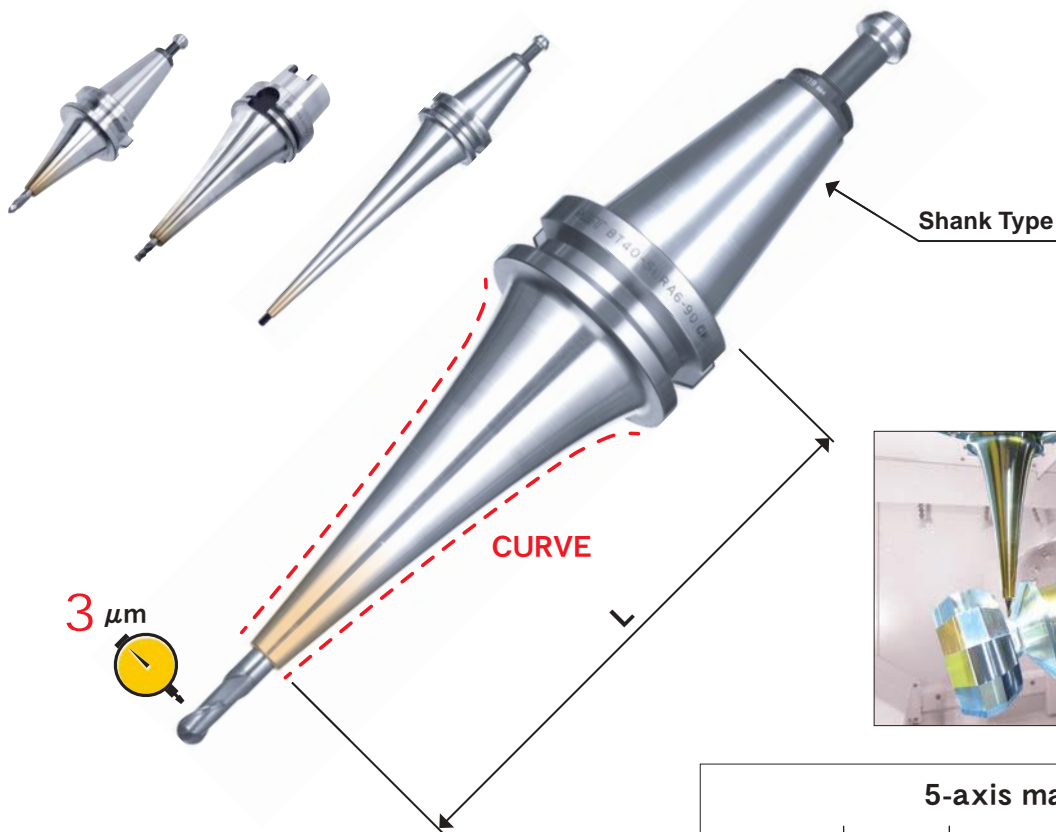
STRAIGHT
arbor

OTHERS

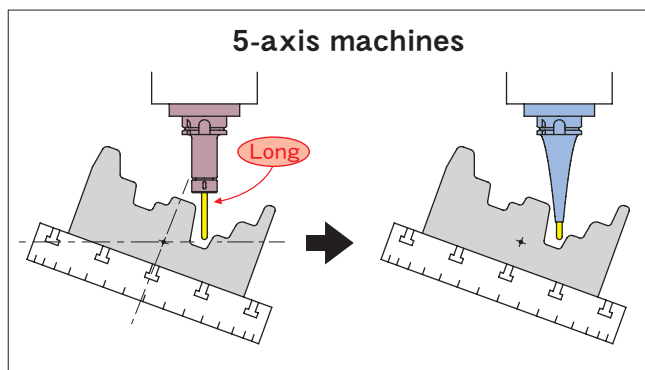
PERIPHERALS

Technical
data

MONO CURVE



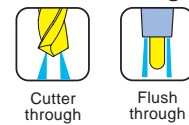
500 variations



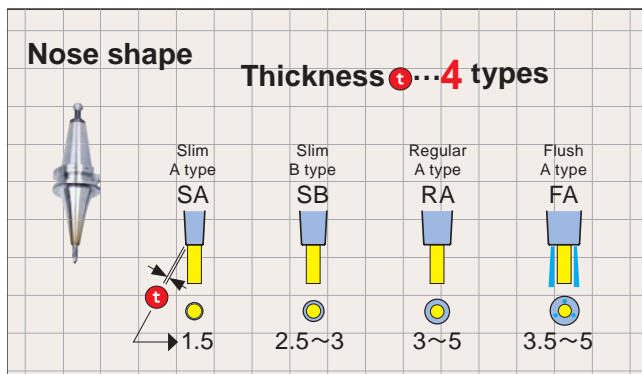
BT50 - SL SA 4 - 165 CV

Shank Type SLIMLINE ϕD L CURVE

Coolant-through



PAGE	
16	BT30
18	BT40
26	BT50
37	A63
47	A100
57	E32
59	E40
61	E50
64	F63
71	CT50



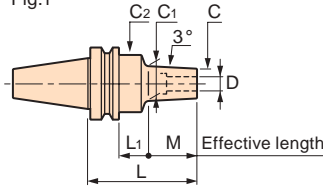
BT30

BT30-SLRA6-75-M22

MONO 3°



Fig.1

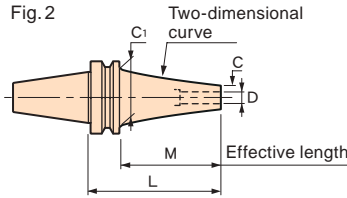


BT30-SLSA6-75 cv

MONO CURVE



Fig.2



Option

- Retention knob → P.104

Caution





- Retention knob ··· Use a retention knob with hole, or remove the retention knob and heat it.
- Setting cutters ··· Be sure to insert the tool beyond the safety mark.

CV : Curve

Thickness

20000 min⁻¹

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg	N	G grade	S			
BT30-SLSA 3- 60-M22	1	3	6	1.5	60	22	16	8.3	20	9	80	0.4	0.8	4.2	4.7			
- 75-M22					75		31				99				4.6			
- 95-M42					95		31				10.4				119	9.2		
-120-M67					120		67				13				144	0.5	1.6	6.7
-SLRA 3- 75-M22	1	3	7.5	3.25	75	22	31	9.8	25	9	99	0.5	1.6	6.7	2.8			
BT30-SLSA 3.175-75-M22	1	3.175	6.175	1.5	75	22	31	8.5	25	9	99	0.4	0.8	4.2	4.4			
-95-M42					95						42				10.6	119	8.8	
BT30-SLSA 4- 75-M22	1	4	7	1.5	75	22	31	9.3	25	12	99	0.4	0.8	4.2	3.6			
- 95-M42					95						42				11.4	119	7.3	
-120-M67					120						67				14	144	0.5	1.6
-SLRA 4- 75-M22	1	4	10	3	75	22	31	12.3	25	12	99	0.5	1.6	6.7	1.8			
-SLSA 4- 75 CV	2	4	7	1.5	75	53	—	34	—	12	99	0.5	1	4.2	1.8			
- 90 CV					90						68				114	1.1	4.6	2.8
-120 CV					120						98				144	1.2	5	6.6
-SLRA 4- 90 CV	2	4	10	3	90	68	—	34	—	12	114	0.5	1	4.2	2			
-120 CV					120						98				144	1.1	4.6	2.9
BT30-SLSA 6- 75-M22	1	6	9	1.5	75	22	31	11.3	25	18	99	0.4	0.9	4.7	2.4			
- 95-M42					95						42				13.4	119	4.9	
-120-M67					120						67				16	144	0.5	1.7
-SLRA 6- 75-M22	1	6	12	3	75	22	31	14.3	25	18	99	0.4	0.9	4.7	1.4			
-SLSA 6- 75 CV	2	6	9	1.5	75	53	—	34	—	18	99	0.5	1.3	5.4	1.5			
- 90 CV					90						68				114	1	4.2	2.4
-120 CV					120						98				144	1.2	5	5.6
-SLRA 6- 90 CV	2	6	13	3.5	90	68	—	34	—	18	114	0.5	1.1	4.6	1.6			
-120 CV					120						98				144	1.2	5	2.5
BT30-SLRA 8- 75-M22	1	8	14	3	75	22	31	16.3	25	24	99	0.4	0.9	4.7	1.2			
-SLSA 8- 75 CV	2	8	11	1.5	75	53	—	34	—	24	99	0.5	1.1	4.6	1.3			
- 90 CV					90						68				114	0.6	1.6	5.6
-SLRA 8- 90 CV	1	8	16	4	90	68	—	34	—	24	114	0.5	1.2	5	1.1			

CODE	Fig.	ϕ D	ϕ C	t	L	M	L ₁	ϕ C ₁	ϕ C ₂	H	h	 Kg	 N	 G grade	 S ↓
BT30-SLRA10- 75-M22	1	10	16	3	75	22	31	18.3	25	30	99	0.4	1	5.2	1.1
-SLSA10- 75 CV	2		13	1.5	75	53	—	34	—	30	99	0.5	1.6	6.7	1.2
- 90 CV					90	68	—				114				
-SLRA10- 90 CV			19	4.5	90	68	—	34	—	30	114	0.6	1.5	5.2	1.1
BT30-SLRA12- 75-M22	1	12	20	4	75	22	31	22.3	25	30	99	0.5	1.2	5	1
BT30-SLRA16- 60-M22		16	26	5	60	22	16	28.3	34	32	60	0.5	1.6	6.7	0.5
BT30-SLRA20- 65-M22		20	32	6	65	22	21	34.3	40	38	60	0.6	2.1	7.3	0.4

Feature

Shrink-fit Heater

MONO 3°
MONO CURVE

MONO Series

2PIECE type

UNO

HYPER
VERSION

Z

STRAIGHT
arbor

OTHERS

PERIPHERALS

Technical
data

BT40

BT40-SLSA10-150-M97

MONO 3°

Rigidity value (μm/kgf)

⊕P.118

Imbalance value(g·mm) **N**

G grade(20000 min⁻¹)

⊕P.121

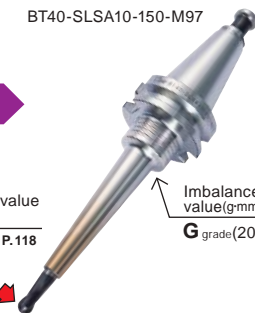


Fig.1

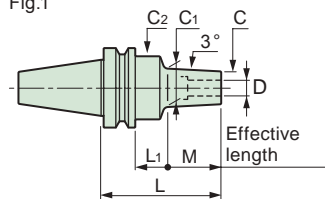
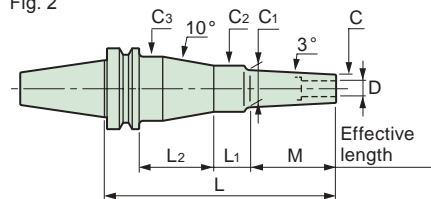


Fig. 2



Compatibility table for HRD-01S

[○] Available [-] Not available

[▲] Usable by raising the heating unit.→P.117

MONO CURVE

BT40-SLFA6-120cv

Rigidity value (μm/kgf)

⊕P.118

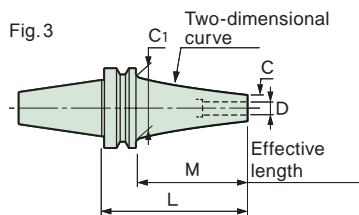
Imbalance value(g·mm) **N**

G grade(20000 min⁻¹)

⊕P.121



Fig.3



■ Option

- Retention knob→P.104

■ Caution



- Retention knob...Use a retention knob with hole, or remove the retention knob and heat it.
- Setting cutters...Be sure to insert the tool beyond the safety mark.

cv: Curve

Thickness

20000 min⁻¹








CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h	Kg	N	G grade	S
BT40-SLSA3- 95-M 42	1	3	6	1.5	95	42	26	—	10.4	25	—	9	130	1	2.3	4.8	9.1
-120-M 67					120	67			13				155		3.1	6.5	14.6
-125-M 42					125	42	56		10.4				160	1.1	2.5	4.8	9.7
-150-M 67					150	67			13				185		3.2	6.1	15.7
-M 97						97	26		16.2						4	7.6	20.4
-155-M 42	2				155	42	33	53	10.4	26	40		190	1.4	2.7	4	9.9
-180-M 67					180	67			13				215		3.4	5.1	15.8
-M 97	1					97	56	—	16.2		—			1.2	4.1	7.2	22.2
-210-M 97	2				210		33	53		25	39		245	1.4	4.3	6.4	22.1
-SLRA3- 75-M 22	1	3	7.5	2.25	75	22	26	—	9.8	25	—	9	110	1	2.6	5.4	2.7
- 95-M 42					95	42			11.9				130		2.9	6.1	5.3
-105-M 22					105	22	56		9.8				140	1.1	2.7	5.1	3.2
-120-M 67					120	67	26		14.5				155		3.4	6.5	8.8
-125-M 42					125	42	56		11.9				160		3	5.7	6
-135-M 22	2				135	22	33	53	9.8		39		170	1.4	2.9	4.3	3.2
-150-M 67	1				150	67	56	—	14.5		—		185	1.2	3.5	6.1	14.5
-M 97						97	26		17.7					1.1	4.1	7.8	12.8
-155-M 42	2				155	42	33	53	11.9	26	40		190	1.4	3.2	4.8	6
-180-M 67					180	67			14.5				215		3.7	5.5	9.8
-M 97	1					97	56	—	17.7		—			1.2	4.2	7.3	14.3
-M127						127	26		20.8	36				1.1	5.4	10.3	15.7
-210-M 97	2				210	97	33	53	17.7	25	39		245	1.5	4.4	6.1	14.4
-M127	1					127	56	—	20.8	32	—			1.4	5.5	8.2	16.5
-240-M127	2				240	127	28	58		36	50		275	1.8	5.8	7.2	16.3

CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h	KG	N	G grade	S
BT40-SLFB3- 75-M 22	1	3	9.5	3.25	75	22	26	—	11.8	25	—	9	110	1	2.4	5	1.9
 - 95-M 42					95	42			13.9				130		2.7	5.7	3.2
-105-M 22					105	22	56		11.8				140	1.1	2.5	4.8	2.3
-120-M 67					120	67	26		16.5				155		3.4	6.5	5.3
-125-M 42					125	42	56		13.9				160		2.8	5.3	3.9
-135-M 22	2				135	22	33	53	11.8		39		170	1.4	2.7	4	2.3
-150-M 67	1				150	67	56	—	16.5	26	—		185	1.2	3.6	6.3	6.3
-155-M 42	2				155	42	33	53	13.9	25	39		190	1.4	3	4.5	3.9
-180-M 67					180	67			16.5	26	40		215		3.8	5.7	6.3
BT40-SLSA4- 95-M 42	1	4	7	1.5	95	42	26	—	11.4	25	—	12	130	1	3.1	6.5	7.1
-120-M 67					120	67			14				155				11.7
-125-M 42					125	42	56		11.4				160	1.1	3.3	6.3	7.9
-150-M 67					150	67			14				185				12.8
-M 97						97	26		17.2						4.1	7.8	16.5
-155-M 42	2				155	42	33	53	11.4		39		190	1.4	3.5	5.2	7.9
-180-M 67					180	67			14				215				12.8
-M 97	1					97	56	—	17.2		—			1.2	4.2	7.3	18.3
-210-M 97	2				210		33	53			39		245	1.5	4.4	6.1	18.2
-SLRA4- 75-M 22	1	4	10	3	75	22	26	—	12.3	25	—	12	110	1	2.7	5.7	1.7
- 95-M 42					95	42			14.4				130		3.1	6.5	3.1
-105-M 22					105	22	56		12.3				140	1.1	2.8	5.3	2.2
-120-M 67					120	67	26		17				155		3.9	7.4	5.1
-125-M 42					125	42	56		14.4				160		3.3	6.3	3.8
-135-M 22	2				135	22	33	53	12.3		39		170	1.4	3	4.5	2.2
-150-M 67	1				150	67	56	—	17		—		185	1.2	4	7	6.3
-M 97						97	26		20.2					1.1	4.8	9.1	7.7
-155-M 42	2				155	42	33	53	14.4		39		190	1.4	3.5	5.2	3.8
-180-M 67					180	67			17				215		4.2	6.3	6.2
-M 97	1					97	56	—	20.2		—			1.2	4.9	8.6	9.5
-M127						127	26		23.3	36				1.3	6.8	11	9.3
-210-M 97	2				210	97	33	53	20.2	25	39		245	1.5	5.1	7.1	9.4
-M127	1					127	56	—	23.3	32	—			1.4	7	10.5	10.3
-240-M127	2				240		30	56			46		275	1.8	7.3	8.5	10.4
-SLFB4- 75-M 22	1	4	12	4	75	22	26	—	14.3	25	—	12	110	1	2.5	5.2	1.3
 - 95-M 42					95	42			16.4				130	1.1	3	5.7	2.2
-105-M 22					105	22	56		14.3				140		2.7	5.1	1.8
-120-M 67					120	67	26		19				155		3.8	7.2	3.5
-125-M 42					125	42	56		16.4				160	1.2	3.1	5.4	2.9
-135-M 22	2				135	22	33	53	14.3	26	40		170	1.4	2.9	4.3	1.8
-150-M 67	1				150	67	56	—	19	25	—		185	1.2	4	7	4.7
-155-M 42	2				155	42	33	53	16.4		39		190	1.4	3.3	4.9	2.9
-180-M 67					180	67			19				215	1.5	4.2	5.9	4.7
-SLSA4- 90 CV	3	4	7	1.5	90	63	—	—	53	—	—	12	125	1.2	3.3	5.8	1.8
-120 CV					120	93							155	1.3	3.8	6.1	2.7
-150 CV					150	123							185	1.5	4.4		4
-180 CV					180	153							215		4.8	6.7	6.6
-210 CV					210	183							245	1.6	4.9	6.4	11.6
-240 CV					240	213							275	1.8	5.8	6.7	14
-SLRA4-120 CV	3	4	10	3	120	93	—	—	53	—	—	12	155	1.3	3.9	6.3	1.9
-150 CV					150	123							185	1.4	4.3	6.4	2.9
-180 CV					180	153							215	1.5	5.1	7.1	4.2
-210 CV					210	183							245	1.7	5.7	7	5.7


CODE	Fig.	ϕD	ϕC	t	L	M	L ₁	L ₂	ϕC_1	ϕC_2	ϕC_3	H	h			G grade	S
BT40-SLSA6- 95-M 42	1	6	9	1.5	95	42	26	—	13.4	25	—	18	130	1	3.3	6.9	4.8
-120-M 67					120	67			16				155	1.1	4.4	8.4	8
-125-M 42					125	42	56		13.4				160		3.5	6.7	5.6
-150-M 67					150	67			16				185	1.2	4.5	7.9	9.2
-M 97						97	26		19.2	32				1.1	5.9	11.2	11
-155-M 42	2				155	42	33	53	13.4	25	39		190	1.4	3.7	5.5	5.6
-180-M 67					180	67			16				215		4.7	7	9.2
-M 97	1					97	56	—	19.2	32	—			1.3	6.1	9.8	11.7
-210-M 97	2				210		30	56			46		245	1.7	6.4	7.9	
-SLSB6- 95-M 42	1	6	10	2	95	42	26	—	14.4	25	—	18	130	1	4	8.4	3.6
-120-M 67					120	67			17				155	1.1	5.4	10.3	6.1
-125-M 42					125	42	56		14.4				160		4.1	7.8	4.5
-150-M 67					150	67			17				185	1.2	5.5	9.6	7.4
-M 97						97	26		20.2	32					7.2	12.6	8.5
-155-M 42	2				155	42	33	53	14.4	25	39		190	1.4	4.3	6.4	4.4
-180-M 67					180	67			17	25	39		215		5.7	8.5	7.4
-M 97	1					97	56	—	20.2	32	—			1.3	7.4	11.9	9.2
-M127						127	26		23.3					1.2	8.9	15.5	11
-210-M 97	2				210	97	30	56	20.2		46		245	1.7	7.7	9.5	9.2
-M127	1					127	56	—	23.3		—			1.4	9.1	13.6	12
-M157						157	26		26.5					1.3	10.6	17.1	13.2
-240-M127	2				240	127	30	56	23.3		46		275	1.8	9.4	10.9	12
-M157	1					157	56	—	26.5	36	—			1.7	10.8	13.3	14.5
-270-M157	2				270		30	56		32	46		305	1.9	11	12.1	14.6
-SLRB6- 75-M 22	1	6	14	4	75	22	26	—	16.3	32	—	18	110	1.1	3.2	6.1	1
- 95-M 42					95	42			18.4				130		4.3	8.2	1.6
-105-M 22					105	22	56		16.3				140	1.2	3.3	5.8	1.2
-120-M 67					120	67	26		21				155		5.6	9.8	2.6
-125-M 42					125	42	56		18.4				160	1.3	4.4	7.1	1.9
-135-M 22	2				135	22	30	56	16.3		46		170	1.6	3.6	4.7	1.2
-150-M 67	1				150	67	56	—	21		—		185	1.3	5.8	9.3	3
-155-M 42	2				155	42	30	56	18.4		46		190	1.6	4.7	6.2	1.9
-180-M 67					180	67			21				215	1.7	6.1	7.5	3.1
-SLFB6- 75-M 22	1	6	14	4	75	22	26	—	16.3	32	—	18	110	1.1	3.2	6.1	1
- 95-M 42					95	42			18.4				130		4.3	8.2	1.6
-105-M 22					105	22	56		16.3				140	1.2	3.3	5.8	1.2
-120-M 67					120	67	26		21				155		5.6	9.8	2.6
-125-M 42					125	42	56		18.4				160	1.3	4.4	7.1	1.9
-135-M 22	2				135	22	30	56	16.3		46		170	1.6	3.6	4.7	1.2
-150-M 67	1				150	67	56	—	21		—		185	1.3	5.8	9.3	3
-155-M 42	2				155	42	30	56	18.4		46		190	1.6	4.7	6.2	1.9
-180-M 67					180	67			21				215	1.7	6.1	7.5	3.1
-SLSA6- 90 CV	3	6	9	1.5	90	63	—	—	53	—	—	18	125	1.2	3.3	5.8	1.6
-120 CV					120	93							155	1.3	3.8	6.1	2.3
-150 CV					150	123							185	1.5	4.3	6	3.6
-180 CV					180	153							215		4.9	6.8	5.7
-210 CV					210	183							245	1.7	5.7	7	7.3
-240 CV					240	213							275	1.8	5.9	6.9	12
-SLRA6- 90 CV	3	6	13	3.5	90	63	—	—	53	—	—	18	125	1.2	3.3	5.8	1.2
-120 CV					120	93							155	1.3	4	6.4	1.7
-150 CV					150	123							185	1.5	4.8	6.7	2.1
-180 CV					180	153							215	1.7	5.6	6.9	2.8
-210 CV					210	183							245		5.9	7.3	4.8
-SLFA6- 90 CV	3	6	13	3.5	90	63	—	—	53	—	—	18	125	1.2	3.3	5.8	1.2
-120 CV					120	93							155	1.3	4	6.4	1.7
-150 CV					150	123							185	1.5	4.8	6.7	2.1
-180 CV					180	153							215	1.7	5.6	6.9	2.8
-210 CV					210	183							245		5.9	7.3	4.8









CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h			G grade	S					
BT40-SLSA8- 95-M 42	1	8	11	1.5	95	42	26	—	15.4	25	—	24	130	1	4.6	9.6	3.4	○				
-120-M 67					120	67	—	18	32	—	155	1.1	6.3	12	5.4	○						
-125-M 42					125	42	56	15.4	36	—	160	1.3	4.7	7.6	3.4	○						
-150-M 67					150	67	—	18	32	—	185	—	6.5	10.5	5.9	○						
-M 97						97	26	21.2	—	—	—	1.2	8.4	14.7	7.9	○						
-155-M 42					2				155	42	33	53	15.4	25	39	—	190	1.4	5	7.5	4.3	○
-180-M 67									180	67	30	56	18	32	46	—	—	—	—	215	1.6	6.7
-M 97					1				97	56	—	21.2	—	—	—	—	—	1.3	8.6	13.9	8.7	○
-210-M 97					2				210	—	28	58	—	36	50	—	245	1.9	8.8	9.7	8.4	○
BT40-SLSB8- 95-M 42					1	8	13	2.5	95	42	26	—	17.4	32	—	24	130	1.1	5.3	10.1	2.1	○
-120-M 67	120	67	—	20					—	—	—	155	—	7.4	14.1	3.5	○					
-125-M 42	125	42	56	17.4					36	—	160	1.3	5.5	8.9	2.3	○						
-150-M 67	150	67	—	20					32	—	185	—	7.6	12.2	4	○						
-M 97		97	26	23.2					—	—	—	1.2	10	17.5	5.2	○						
-155-M 42	2								155	42	30	56	17.4	—	46	—	190	1.6	5.7	7.5	2.5	○
-180-M 67									180	67	—	20	—	—	—	—	—	—	—	215	1.7	7.9
-M 97	1								97	56	—	23.2	—	—	—	—	—	1.4	10.2	15.3	6	○
-M127	1								127	26	—	26.3	—	—	—	—	—	1.3	12.6	20.3	7	○
-210-M 97									210	97	30	56	23.2	—	46	—	—	—	—	245	1.7	10.4
-M127	1								127	56	—	26.3	36	—	—	—	—	1.5	12.7	17.7	7.7	○
-M157	2								157	26	—	29.5	—	—	—	—	—	1.4	15.1	22.6	8.5	○
-240-M127									240	127	30	56	26.3	32	46	—	—	—	—	275	1.8	13
-M157	1								157	56	—	29.5	42	—	—	—	—	1.7	15.3	18.8	8.6	○
-270-M157	2								270	—	28	58	—	—	53	—	305	2.2	15.6	14.9	8.7	○
-SLRB8- 75-M 22	1	8	18	5					75	22	26	—	20.3	32	—	24	110	1.1	3.6	6.9	0.7	—
- 95-M 42					95	42	—	22.4	—	—	—	130	—	5.3	10.1	1.1	○					
-105-M 22					105	22	56	20.3	—	—	—	140	1.2	3.8	6.6	0.9	—					
-120-M 67					120	67	26	25	—	—	—	155	—	7.5	13.1	1.7	○					
-125-M 42					125	42	56	22.4	—	—	—	160	1.3	5.5	8.9	1.4	○					
-135-M 22					2				135	22	30	56	20.3	—	46	—	170	1.6	4.1	5.4	1	—
-150-M 67									150	67	56	—	25	—	—	—	—	—	—	185	1.4	7.6
-155-M 42					2				155	42	30	56	22.4	—	46	—	190	1.7	5.8	7.1	1.5	○
-180-M 67									180	67	—	25	—	—	—	—	—	—	—	215	1.8	7.9
-SLFB8- 75-M 22					1	8	18	5	75	22	26	—	20.3	32	—	24	110	1.1	3.6	6.9	0.7	—
- 95-M 42	95	42	—	22.4					—	—	—	130	—	5.3	10.1	1.1	○					
-105-M 22	105	22	56	20.3					—	—	—	140	1.2	3.8	6.6	0.9	—					
-120-M 67	120	67	26	25					—	—	—	155	—	7.5	13.1	1.7	○					
-125-M 42	125	42	56	22.4					—	—	—	160	1.3	5.5	8.9	1.4	○					
-135-M 22	2								135	22	30	56	20.3	—	46	—	170	1.6	4.1	5.4	1	—
-150-M 67									150	67	56	—	25	—	—	—	—	—	—	185	1.4	7.6
-155-M 42	2								155	42	30	56	22.4	—	46	—	190	1.7	5.8	7.1	1.5	○
-180-M 67									180	67	28	58	25	36	50	—	—	—	—	215	1.9	7.9
-SLSA8- 90 CV	3	8	11	1.5					90	63	—	—	53	—	—	24	125	1.2	3.3	5.8	1.4	○
-120 CV					120	93	—	—	—	—	—	155	1.3	4	6.4	2	○					
-150 CV					150	123	—	—	—	—	—	185	1.5	4.8	6.7	2.7	○					
-180 CV					180	153	—	—	—	—	—	215	1.6	4.9	6.4	5	○					
-210 CV					210	183	—	—	—	—	—	245	1.7	5.8	7.1	6.6	○					
-240 CV					240	213	—	—	—	—	—	275	1.9	6.7	7.4	8.3	○					
-SLRA8- 90 CV	3	8	16	4	90	63	—	—	53	—	—	24	125	1.2	3.8	6.6	0.7	○				
-120 CV					120	93	—	—	—	—	—	155	1.4	4.2	6.3	1.2	○					
-150 CV					150	123	—	—	—	—	—	185	1.6	4.9	6.4	1.8	○					
-180 CV					180	153	—	—	—	—	—	215	1.7	5.7	7	2.6	○					
-210 CV					210	183	—	—	—	—	—	245	1.8	6.5	7.6	3.5	○					
-SLFA8- 90 CV	3	8	16	4	90	63	—	—	53	—	—	24	125	1.2	3.8	6.6	0.7	○				
-120 CV					120	93	—	—	—	—	—	155	1.4	4.2	6.3	1.2	○					
-150 CV					150	123	—	—	—	—	—	185	1.6	4.9	6.4	1.8	○					
-180 CV					180	153	—	—	—	—	—	215	1.7	5.7	7	2.6	○					
-210 CV					210	183	—	—	—	—	—	245	1.8	6.5	7.6	3.5	○					

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	 Kg	 N	 G grade	 S		
BT40-SLSA10- 95-M 42	1	10	13	1.5	95	42	26	—	17.4	25	—	11	30	130	1	5.5	2.6	○	
-120-M 67					120	67			20	32				155	1.1	8.1	4	○	
-125-M 42					125	42	56		17.4	36				160	1.3	5.7	2.5	○	
-150-M 67					150	67			20	32				185		8.2	4.6	○	
-M 97					97	26			23.2						1.2		6	○	
-155-M 42	2				155	42	28	58	17.4	36	50			190	1.8	5.9	2.5	○	
-180-M 67					180	67			20					215		8.5	4.4	○	
-M 97	1				97	56	—	—	23.2	32	—				1.3		6.9	○	
-210-M 97	2				210		30	56			46			245	1.7			○	
BT40-SLSB10- 95-M 42	1	10	16	3	95	42	26	—	20.4	32	—	30	130	1.1	6.3	12	1.4	○	
-120-M 67					120	67			23					155	1.2	9.3	16.2	2.4	○
-125-M 42					125	42	56		20.4					160	1.3	6.4	10.3	1.8	○
-150-M 67					150	67			23					185		9.5	15.3	3	○
-M 97					97	26			26.2						13	20.9	3.6	○	
-155-M 42	2				155	42	30	56	20.4		46			190	1.6	6.7	8.8	1.9	○
-180-M 67					180	67	30	56	23					215	1.7	9.8	12.1	3	○
-M 97	1				97	56	—	—	26.2		—				1.4	13.2	19.7	4.5	○
-M127					127	26			29.3	42					17.4	26			○
-210-M 97	2				210	97	30	56	26.2	32	46			245	1.8	13.5	15.7		○
-M127	1				127	56	—	—	29.3	50	—				17.9	20.8	4.7		○
-M157					157	26			32.5	42					1.5	21.1	29.5	5.6	○
-240-M127					240	127	86		29.3	50				275	2.1	18.5	18.4	5	▲
-M157					157	56			32.5						1.8	21.7	25.2	5.8	○
-270-M157	2				270		28	58		42	53			305	2.3	22.2	20.2	6.3	○
-SLRB10- 75-M 22	1	10	22	6	75	22	26	—	24.3	32	—	30	110	1.1	3.8	7.2	0.6	○	
- 95-M 42					95	42			26.4					130	1.2	6.3	11	0.8	○
-105-M 22					105	22	56		24.3					140	1.3	4	6.4		○
-120-M 67					120	67	26		29	42				155		9.4	15.1	1.1	○
-125-M 42					125	42	56		26.4	32				160		6.5	10.5	1.2	○
-135-M 22	2				135	22	30	56	24.3		46			170	1.7	4.3	5.3	0.9	○
-150-M 67	1				150	67	56	—	29	42	—			185	1.5	9.6	13.4	1.3	○
-155-M 42	2				155	42	30	56	26.4	32	46			190	1.7	6.8	8.4		○
-180-M 67					180	67	28	58	29	42	53			215	2.1	9.8	9.8	1.4	○
-SLFB10- 75-M 22	1	10	22	6	75	22	26	—	24.3	32	—	30	110	1.1	3.8	7.2	0.6	○	
 - 95-M 42					95	42			26.4					130	1.2	6.3	11	0.8	○
-105-M 22					105	22	56		24.3					140	1.3	4	6.4		○
-120-M 67					120	67	26		29	42				155		9.4	15.1	1.1	○
-125-M 42					125	42	56		26.4	32				160		6.5	10.5	1.2	○
-135-M 22	2				135	22	30	56	24.3		46			170	1.7	4.3	5.3	0.9	○
-150-M 67	1				150	67	56	—	29	42	—			185	1.5	9.6	13.4	1.3	○
-155-M 42	2				155	42	28	58	26.4	36	50			190	1.9	6.8	7.5	1.1	○
-180-M 67					180	67			29					215	2	9.8	10.3	1.6	○
-SLSA10- 90 CV	3	10	13	1.5	90	63	—	—	53	—	—	30	125	1.2	3.3	5.8	1.8	○	
-120 CV					120	93								155	1.5	4.3	6	1.3	○
-150 CV					150	123								185	1.6	4.9	6.4	2.2	○
-180 CV					180	153								215	1.7	5.6	6.9	3.4	○
-210 CV					210	183								245		6	7.4	6	○
-240 CV					240	213								275	2	7.9	8.3	5.8	▲
-SLRA10- 90 CV	3	10	19	4.5	90	63	—	—	53	—	—	30	125	1.3	3.8	6.1	0.7	○	
-120 CV					120	93								155	1.4	4.6	6.9	0.9	○
-150 CV					150	123								185	1.6	5.4	7.1	1.4	○
-180 CV					180	153								215	1.8	6.3	7.3	2	○
-210 CV					210	183								245		7.2	8.4	3.1	○
-SLFA10- 90 CV	3	10	19	4.5	90	63	—	—	53	—	—	30	125	1.3	3.8	6.1	0.7	○	
 -120 CV					120	93								155	1.4	4.6	6.9	0.9	○
-150 CV					150	123								185	1.6	5.4	7.1	1.4	○
-180 CV					180	153								215	1.8	6.3	7.3	2	○
-210 CV					210	183								245		7.2	8.4	3.1	○

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S	
BT40-SLSA12- 95-M 42	1	12	15	1.5	95	42	26	—	19.4	32	—	30	130	1.1	7.1	13.5	1.8	○
-120-M 67					120	67			22				155		10.7	20.4	3.3	
-125-M 42					125	42	56		19.4				160	1.2	7.3	12.7	2.3	
-150-M 67					150	67			22	36			185	1.4	10.9	16.3	3.6	
-M 97						97	26		25.2	32				1.2	15.3	26.7	4.9	
-155-M 42	2				155	42	28	58	19.4	36	50		190	1.8	7.5	8.7	2.1	
-180-M 67					180	67	30	56	22	32	46		215	1.7	11.2	13.8	3.9	
-M 97	1					97	56	—	25.2		—			1.4	15.5	23.2	5.8	
-210-M 97	2				210		30	56			46		245	1.7	15.8	19.5		
-SLSB12- 95-M 42	1	12	19	3.5	95	42	26	—	23.4	32	—	30	130	1.1	8	15.2	1.1	○
-120-M 67					120	67			26				155	1.2	12.2	21.3	1.8	
-125-M 42					125	42	56		23.4				160	1.3	8.2	13.2	1.5	
-150-M 67					150	67			26	32			185		12.4	20	2.5	
-M 97						97	26		29.2	42					17.9	28.8	2.4	
-155-M 42	2				155	42	30	56	23.4	32	46		190	1.7	8.4	10.3	1.6	
-180-M 67					180	67	28	58	26	36	50		215	1.9	12.6	13.9	2.2	
-M 97	1					97	56	—	29.2	50	—			1.7	18.4	22.7	2.6	
-180-M127						127	26		32.3	42				1.5	22.9	32	3.3	
-210-M 97					210	97	86		29.2	50			245	2.1	19	18.9	2.9	
-M127						127	56		32.3					1.9	23.5	25.9	3.5	
-M157						157	26		35.5	42				1.7	27.9	34.4	4.1	
-240-M127					240	127	86		32.3	50			275	2.2	24	22.8	3.8	▲
-M157						157	56		35.5					2	28.5	29.8	4.4	
-270-M157					270		86						305	2.4	29.1	25.4	4.8	
-SLRB12- 75-M 22	1	12	26	7	75	22	26	—	28.3	42	—	30	110	1.2	6.9	12	0.4	—
- 95-M 42					95	42			30.4				130		8.7	15.2	0.6	
-105-M 22					105	22	56		28.3				140	1.4	7.5	11.2	0.5	
-120-M 67					120	67	26		33				155		12.9	19.3	0.8	
-125-M 42					125	42	56		30.4	50			160	1.6	9.3	12.2	0.6	
-135-M 22					135	22	86		28.3				170	1.8	8.1	9.4		
-150-M 67					150	67	56		33	42			185	1.6	13.5	17.7	1.1	
-155-M 42	2				155	42	28	58	30.4		53		190	2	9.9	10.4	0.8	
-180-M 67					180	67			33				215	2.1	14.1	14.1	1.1	
-SLFB12- 75-M 22	1	12	26	7	75	22	26	—	28.3	42	—	30	110	1.2	6.9	12	0.4	—
- 95-M 42					95	42			30.4				130		8.7	15.2	0.6	
-105-M 22					105	22	56		28.3				140	1.4	7.5	11.2	0.5	
-120-M 67					120	67	26		33				155		12.9	19.3	0.8	
-125-M 42					125	42	56		30.4				160	1.5	9.3	13	0.7	
-135-M 22	2				135	22	28	58	28.3		53		170	1.9	8.1	8.9	0.6	
-150-M 67	1				150	67	56	—	33		—		185	1.6	13.5	17.7	1.1	
-155-M 42					155	42	86		30.4	50			190	2	9.9	10.4	0.8	
-180-M 67					180	67			33				215	2.1	14.1	14.1	1.1	
-SLSA12- 90 CV	3	12	15	1.5	90	63	—	—	53	—	—	30	125	1.3	3.7	6	1.5	○
-120 CV					120	93							155	1.5	4.6	6.4	1.2	
-150 CV					150	123							185		4.9	6.8	2.4	
-180 CV					180	153							215	1.7	5.7	7	3.3	
-210 CV					210	183							245	1.9	6.6	7.3	4.6	
-240 CV					240	213							275	2	8	8.4	5.5	▲
-SLRA12- 90 CV	3	12	22	5	90	63	—	—	53	—	—	30	125	1.3	3.9	6.3	0.6	—
-120 CV					120	93							155	1.6	5.1	6.7	0.7	
-150 CV					150	123							185	1.7	6	7.4	1.1	○
-180 CV					180	153							215		6.9	8.5	1.9	
-210 CV					210	183							245	1.8	7.7	9	2.8	
-SLFA12- 90 CV	3	12	22	5	90	63	—	—	53	—	—	30	125	1.3	3.9	6.3	0.6	—
-120 CV					120	93							155	1.6	5.1	6.7	0.7	○
-150 CV					150	123							185	1.7	6	7.4	1.1	
-180 CV					180	153							215		6.9	8.5	1.9	
-210 CV					210	183							245	1.8	7.7	9	2.8	

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G _{grade}	S
BT40-SLSB16- 95-M 42	1	16	24	4	95	42	26	—	28.4	42	—	32	105	1.2	12.4	21.6	0.7
-120-M 67					120	67			31				130	1.3	19.3	31.1	1.1
-125-M 42					125	42	56		28.4				135	1.4	13	19.4	0.9
-150-M 67					150	67			31				160	1.5	19.8	27.6	1.4
-M 97						97	26		34.2	42				1.4	27.6	41.3	1.7
-155-M 42	2				155	42	28	58	28.4		53		165	1.9	13.5	14.9	1
-180-M 67					180	67			31				190	2	20.4	21.4	1.5
-M 97	1					97	56	—	34.2	50	—			1.8	28.1	32.7	1.9
-M127						127	26		37.3	53				1.7	35.8	44.1	2.1
-210-M 97					210	97	86		34.2	50			220	2.1	28.7	28.6	
-M127						127	56		37.3					2	36.4	38.1	2.5
-M157						157	26		40.5					1.9	44.1	48.6	2.8
-240-M127					240	127	86		37.3	53			250	2.5	37	31	2.6
-M157						157	56		40.5	50				2.2	44.7	42.6	3.1
-270-M157					270		86						280	2.5	45.3	37.9	3.5
-SLRB16- 75-M 22	1	16	32	8	75	22	26	—	34.3	42	—	32	85	1.2	6.9	12	0.3
- 95-M 42					95	42			36.4				105	1.3	12.5	20.1	0.5
-105-M 22					105	22	56		34.3				115	1.4	7.5	11.2	
-120-M 67					120	67	26		39				130	1.5	19.4	27.1	0.7
-125-M 42					125	42	56		36.4				135	1.6	13	17	
-135-M 22					135	22	86		34.3	50			145	1.9	8.1	8.9	0.5
-150-M 67					150	67	56		39	42			160	1.7	20	24.6	0.9
-155-M 42	2				155	42	28	58	36.4		53		165	2.1	13.6	13.6	0.7
-180-M 67					180	67			39				190	2.3	20.5	18.7	1
-SLFB16- 75-M 22	1	16	32	8	75	22	26	—	34.3	42	—	32	85	1.2	6.9	12	0.3
 - 95-M 42					95	42			36.4				105	1.3	12.5	20.1	0.5
-105-M 22					105	22	56		34.3				115	1.4	7.5	11.2	
-120-M 67					120	67	26		39				130	1.5	19.4	27.1	0.7
-125-M 42					125	42	56		36.4				135	1.6	13	17	
-135-M 22					135	22	86		34.3	50			145	1.9	8.1	8.9	0.5
-150-M 67					150	67	56		39	42			160	1.7	20	24.6	0.9
-155-M 42					155	42	86		36.4	50			165	2	13.6	14.2	0.7
-180-M 67					180	67			39				190	2.2	20.5	19.5	1
-SLSB16- 90 CV	3	16	21	2.5	90	63	—	—	53	—	—	32	100	1.3	4.2	6.8	0.6
-120 CV					120	93							130	1.5	5.5	7.7	0.8
-150 CV					150	123							160	1.6	6.2	8.1	1.5
-180 CV					180	153							190	1.9	7.5	8.3	1.9
-210 CV					210	183							220	2	8.2	8.6	3
-240 CV					240	213							250	2.2	9.5	9	3.7
BT40-SLSB20- 95-M 42	1	20	29	4.5	95	42	26	—	33.4	42	—	40	105	1.2	14.2	24.8	0.6
-120-M 67					120	67			36				130	1.3	24.5	39.5	0.9
-125-M 42					125	42	56		33.4				135	1.5	14.8	20.7	0.8
-150-M 67					150	67			36				160	1.6	25	32.7	1.2
-M 97						97	26		39.2	53					36.8	48.2	1.2
-155-M 42	2				155	42	28	58	33.4	42	53		165	2	15.3	16	0.9
-180-M 67	1				180	67	86	—	36	50	—		190		25.6	26.8	1.2
-M 97						97	56		39.2					1.9	37.4	41.2	1.4
-M127						127	26		42.3	53				1.8	50	58.2	1.6
-210-M 97					210	97	86		39.2	50			220	2.2	38	36.2	1.7
-M127						127	56		42.3					2.1	50.5	50.4	1.9
-M157						157	26		45.5					2	62.3	65.2	2.1
-240-M127					240	127	86		42.3				250	2.4	51.1	44.6	2.3
-M157						157	56		45.5						62.9	54.9	2.4
-270-M157					270		86						280	2.7	63.5	49.3	2.9

CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h	 Kg	 N	 G grade	 S		
BT40-SLRB20- 95-M 42	1	20	38	9	95	42	26	—	42.4	53	—	40	105	1.5	14.3	20	0.4		
-120-M 67					120	67	—	45	—	—	—	—	—	—	130	1.7	24.6	30.3	0.5
-125-M 42					125	42	56	42.4	—	—	—	—	—	—	135	1.9	14.9	16.4	—
-150-M 67					150	67	—	45	50	—	—	—	—	—	160	2	25.2	26.4	0.7
-155-M 42					155	42	86	42.4	—	—	—	—	—	—	165	2.1	15.4	15.4	—
-180-M 67					180	67	—	45	—	—	—	—	—	—	190	2.3	25.7	23.4	0.9
-SLFB20- 95-M 42					1	20	38	9	95	42	26	—	42.4	53	—	40	105	1.5	14.3
 -120-M 67	120	67	—	45					—	—	—	—	—	—	130	1.7	24.6	30.3	0.5
-125-M 42	125	42	56	42.4					—	—	—	—	—	—	135	1.9	14.9	16.4	—
-150-M 67	150	67	—	45					50	—	—	—	—	—	160	2	25.2	26.4	0.7
-155-M 42	155	42	86	42.4					—	—	—	—	—	—	165	2.1	15.4	15.4	—
-180-M 67	180	67	—	45					—	—	—	—	—	—	190	2.3	25.7	23.4	0.9
-SLSB20- 90 CV	3	20	26	3					90	63	—	—	50.5	—	—	40	100	1.3	4.4
-120 CV					120	93	—	53	—	—	—	—	—	—	130	1.5	5.8	8.1	0.8
-150 CV					150	123	—	—	—	—	—	—	—	—	160	1.6	6.7	8.8	1.3
-180 CV					180	153	—	—	—	—	—	—	—	—	190	1.9	8	—	1.8
-210 CV					210	183	—	—	—	—	—	—	—	—	220	2.1	9.4	9.4	2.3
-240 CV					240	213	—	—	—	—	—	—	—	—	250	2.4	10.7	9.3	3
BT40-SLRB25- 95-M 42					1	25	45	10	95	42	26	—	49.6	53	—	45	105	1.5	16.4
-125-M 42	125	—	56	—					—	—	—	—	—	135	1.9	17	18.7	0.4	
-155-M 42	155	—	86	—					—	—	—	—	—	165	2.3	17.5	15.9	0.6	
-SLFB25- 95-M 42	1	25	45	10	95	42	26	—	49.6	53	—	45	105	1.5	16.4	22.9	0.3		
 -125-M 42					125	—	56	—	—	—	—	—	—	135	1.9	17	18.7	0.4	
-155-M 42					155	—	86	—	—	—	—	—	—	165	2.3	17.5	15.9	0.6	

Feature

Shrink-fit Heater

MONO 3°
MONO CURVE

MONO Series

2PIECE type

UNO

HYPER
VERSION

Z

STRAIGHT
arbor

OTHERS

PERIPHERALS

Technical
data

25

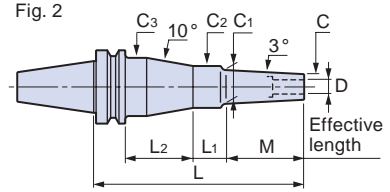
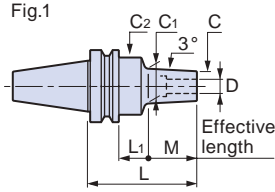
BT50

BT50-SLSB16-225-M157

MONO 3°

Rigidity value
($\mu\text{m}/\text{kgf}$)
P.118

Imbalance value(g·mm) **(N)**
 G_{grade} (10000 min⁻¹)
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Compatibility table
for HRD-01S

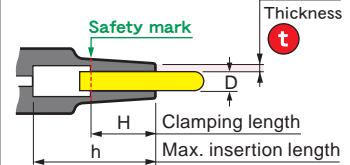
[○] Available [-] Not available
[▲] Usable by raising the heating unit.→P.117

Option

- Retention knob→P.104

Caution

- Retention knob...Use a retention knob with hole, or remove the retention knob and heat it.
- Setting cutters...Be sure to insert the tool beyond the safety mark.

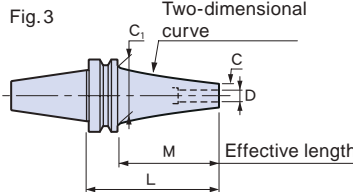


MONO CURVE

BT50-SLSA6-225 cv

Rigidity value
($\mu\text{m}/\text{kgf}$)
P.118

Imbalance value(g·mm) **(N)**
 G_{grade} (10000 min⁻¹)
P.121






CV: Curve



Thickness

10000 min⁻¹

CODE	Fig.	ϕD	ϕC	t	L	M	L ₁	L ₂	ϕC_1	ϕC_2	ϕC_3	H	h	kg	(N)	G _{grade}	S
BT50-SLSA3-110-M 42	1	3	6	1.5	110	42	30	—	10.4	25	—	9	165	3.6	4.4	1.3	9.1
-135-M 67					135	67			13				190		5.1	1.5	14.7
-140-M 42					140	42	60		10.4				195	3.7	4.4	1.2	9.8
-165-M 67					165	67			13				220		5.2	1.5	15.9
-M 97						97	30		16.2	26					6	1.7	20.8
-170-M 42	2				170	42	33	57	10.4		40		225	4.1	4.6	1.2	9.9
-195-M 67					195	67			13				250		5.4	1.4	15.8
-M 97	1					97	60	—	16.2		—			3.8	6.1	1.7	22.3
-225-M 97	2				225		33	57			40		280	4.1	6.2	1.6	22.1
-SLRA3- 90-M 22	1	3	7.5	2.25	90	22	30	—	9.8	25	—	9	145	3.6	4.6	1.3	2.8
-110-M 42					110	42			11.9	26			165	3.7	4.9	1.4	5.4
-120-M 22					120	22	60		9.8	25			175		4.7	1.3	3.2
-135-M 67					135	67	30		14.5	26			190		5.4	1.5	9
-140-M 42					140	42	60		11.9				195	3.8	5	1.4	6
-150-M 22	2				150	22	33	57	9.8	25	39		205	4	4.9	1.3	3.2
-165-M 67	1				165	67	60	—	14.5		—		220	3.8	5.5	1.5	10
-M 97						97	30		17.7	26				3.7	6.1	1.7	13
-170-M 42	2				170	42	33	57	11.9		40		225	4.1	5.1	1.3	6
-195-M 67					195	67			14.5				250		5.7	1.5	9.8
-M 97	1					97	60	—	17.7		—			3.8	6.2	1.7	14.5
-M127						127	30		20.8	32					7.7	2.1	15.7
-225-M 97	2				225	97	33	57	17.7	26	40		280	4.1	6.3	1.7	14.3
-M127	1					127	60	—	20.8	36	—				7.7	2.1	16.3
-255-M127	2				255		30	60		32	46		310	4.4	8	1.9	16.5

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S
BT50-SLFB3- 90-M 22	1	3	9.5	3.25	90	22	30	—	11.8	26	—	9	145	3.6	4.4	1.3	1.9
 -110-M 42					110	42			13.9				165	3.7	4.7	1.3	3.3
-120-M 22					120	22	60		11.8	25			175		4.5	1.3	2.4
-135-M 67					135	67	30		16.5	26			190		5.4	1.5	5.4
-140-M 42					140	42	60		13.9	25			195		4.8	1.4	4
-150-M 22	2				150	22	33	57	11.8		39		205	4	4.6	1.2	2.3
-165-M 67	1				165	67	60	—	16.5	26	—		220	3.8	5.5	1.5	6.4
-170-M 42	2				170	42	33	57	13.9	25	39		225	4	4.9	1.3	3.9
-195-M 67					195	67			16.5				250	4.1	5.7	1.5	6.4
BT50-SLSA4-110-M 42	1	4	7	1.5	110	42	30	—	11.4	25	—	12	165	3.6	5.1	1.5	7.2
-135-M 67					135	67			14				190		5.2	1.5	11.8
-140-M 42					140	42	60		11.4				195	3.7		1.5	8
-165-M 67					165	67			14				220			1.5	13
-M 97						97	30		17.2						6.1	1.7	16.7
-170-M 42	2				170	42	33	57	11.4		39		225	4	5.4	1.4	7.9
-195-M 67					195	67			14				250			1.4	12.8
-M 97	1					97	60	—	17.2		—			3.8	6.2	1.7	18.5
-225-M 97	2				225		33	57			39		280	4.1	6.3	1.6	18.2
-SLRA4- 90-M 22	1	4	10	3	90	22	30	—	12.3	25	—	12	145	3.6	4.7	1.4	1.7
-110-M 42					110	42			14.4				165		5.1	1.5	3.1
-120-M 22					120	22	60		12.3				175	3.7	4.8	1.4	2.2
-135-M 67					135	67	30		17	26			190		5.9	1.7	5.2
-140-M 42					140	42	60		14.4	25			195		5.2	1.5	3.9
-150-M 22	2				150	22	33	57	12.3		39		205	4	5	1.3	2.2
-165-M 67	1				165	67	60	—	17		—		220	3.8	5.9	1.6	6.4
-M 97						97	30		20.2					3.7	6.8	1.9	7.9
-170-M 42	2				170	42	33	57	14.4	26	40		225	4.1	5.4	1.4	3.7
-195-M 67					195	67			17	25	39		250		6.1	1.6	6.2
-M 97	1					97	60	—	20.2		—			3.8	6.9	1.9	9.7
-M127						127	30		23.3	32					9.2	2.5	9.4
-225-M 97	2				225	97	30	60	20.2	25	39		280	4.1	7.1	1.8	
-M127	1					127	60	—	23.3	32	—			4	9.2	2.4	10.4
-255-M127	2				255		30	60			46		310	4.4	9.5	2.3	10.3
-SLFB4- 90-M 22	1	4	12	4	90	22	30	—	14.3	26	—	12	145	3.7	4.6	1.3	1.4
 -110-M 42					110	42			16.4				165		5	1.4	2.2
-120-M 22					120	22	60		14.3	25			175		4.6	1.3	1.9
-135-M 67					135	67	30		19	26			190		5.8	1.6	3.6
-140-M 42					140	42	60		16.4				195	3.8	5.1	1.4	2.9
-150-M 22	2				150	22	33	57	14.3	25	39		205	4	4.8	1.3	1.8
-165-M 67	1				165	67	60	—	19		—		220	3.8	5.9	1.6	4.8
-170-M 42	2				170	42	33	57	16.4	26	40		225	4.1	5.3	1.4	2.8
-195-M 67					195	67			19				250	4.2	6.1	1.5	4.5
-SLSA4-165 CV	3	4	7	1.5	165	127	—	—	85	—	—	12	220	5.2	15.4	3.1	1.8
-195 CV					195	157							250	5.3	15.9	3.1	2.6
-225 CV					225	187							280	5.5	16.4	3.1	3.8
-255 CV					255	217							310	5.6	16.9	3.2	5.7
-285 CV					285	247							340	6.4	19.5	3.2	5.9
-315 CV					315	277							370	8.3	26	3.3	7.7
BT50-SLSA6-110-M 42	1	6	9	1.5	110	42	30	—	13.4	25	—	18	165	3.6	5.4	1.6	4.8
-135-M 67					135	67			16				190	3.7	6.4	1.8	8.1
-140-M 42					140	42	60		13.4				195		5.4	1.5	5.7
-165-M 67					165	67			16				220	3.8	6.5	1.8	9.4
-M 97						97	30		19.2	32				3.7	8.3	2.3	11
-170-M 42	2				170	42	33	57	13.4	26	40		225	4.1	5.6	1.4	5.5
-195-M 67					195	67			16	25	39		250	4	6.6	1.7	9.2
-M 97	1					97	60	—	19.2	32	—			3.9	8.2	2.2	11.7
-225-M 97	2				225		30	60			46		280	4.3	8.5	2.1	

CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h	Kg	N	G grade	S
BT50-SLSB6-110-M 42	1	6	10	2	110	42	30	—	14.4	25	—	18	165	3.6	6	1.7	3.7
-135-M 67					135	67			17				190	3.7	7.4	2.1	6.2
-140-M 42					140	42	60		14.4				195		6.1	1.7	4.6
-165-M 67					165	67			17				220	3.8	7.4	2	7.6
-M 97						97	30		20.2	32					9.6	2.6	8.5
-170-M 42	2				170	42	33	57	14.4	25	39		225	4	6.2	1.6	4.4
-195-M 67					195	67			17				250	4.1	7.6	1.9	7.3
-M 97	1					97	60	—	20.2	32	—			3.9	9.6	2.6	9.2
-M127						127	30		23.3					3.8	11.3	3.1	11.1
-225-M 97	2				225	97		60	20.2		46		280	4.3	9.9	2.4	9.2
-M127	1					127	60	—	23.3		—			4	11.2	2.9	12.1
-M157						157	30		26.5					3.9	13	3.5	13.3
-255-M127	2				255	127		60	23.3	32	46		310	4.4	11.5	2.7	12
-M157	1					157	60	—	26.5		—			4.1	12.9	3.3	14.7
-285-M157	2				285		30	60			46		340	4.5	13.2	3.1	14.5
-SLRB6- 90-M 22	1	6	14	4	90	22	30	—	16.3	32	—	18	145	3.7	5.5	1.6	1
-110-M 42					110	42			18.4				165		6.6	1.9	1.6
-120-M 22					120	22	60		16.3				175	3.8	5.5	1.5	1.2
-135-M 67					135	67	30		21				190		8	2.2	2.6
-140-M 42					140	42	60		18.4				195	3.9	6.6	1.8	1.9
-150-M 22	2				150	22	30	60	16.3		46		205	4.2	5.8	1.4	1.2
-165-M 67	1				165	67	60	—	21		—		220	3.9	8	2.1	3.1
-170-M 42	2				170	42	30	60	18.4		46		225	4.3	6.9	1.7	1.9
-195-M 67					195	67			21				250		8.3	2	3
-SLFB6- 90-M 22	1	6	14	4	90	22	30	—	16.3	32	—	18	145	3.7	5.5	1.6	1
 -110-M 42					110	42			18.4				165		6.6	1.9	1.6
-120-M 22					120	22	60		16.3				175	3.8	5.5	1.5	1.2
-135-M 67					135	67	30		21				190		8	2.2	2.6
-140-M 42					140	42	60		18.4				195	3.9	6.6	1.8	1.9
-150-M 22	2				150	22	30	60	16.3		46		205	4.2	5.8	1.4	1.2
-165-M 67	1				165	67	60	—	21		—		220	3.9	8	2.1	3.1
-170-M 42	2				170	42	30	60	18.4		46		225	4.3	6.9	1.7	1.9
-195-M 67					195	67			21				250		8.3	2	3
-SLSA6-165 CV	3	6	9	1.5	165	127	—	—	85	—	—	18	220	5.1	15.1	3.1	1.5
-195 CV					195	157							250	5.2	15.5	3.1	2.4
-225 CV					225	187							280	5.7	16.8	3.1	2.9
-255 CV					255	217							310	5.9	18.4	3.3	4
-285 CV					285	247							340	6.2	19.5	3.3	5.2
-315 CV					315	277							370	8.4	26.8	3.3	6.9
BT50-SLSA8-110-M 42	1	8	11	1.5	110	42	30	—	15.4	25	—	24	165	3.6	6.9	2	3.5
-135-M 67					135	67			18	32			190	3.7	8.7	2.5	5.4
-140-M 42					140	42	60		15.4	25			195		6.9	2	4.4
-165-M 67					165	67			18	32			220	3.9	8.6	2.3	5.9
-M 97						97	30		21.2					3.8	10.8	3	7.9
-170-M 42	2				170	42	33	57	15.4	25	39		225	4	7.2	1.9	4.3
-195-M 67					195	67	28	62	18	36	50		250	4.5	8.9	2.1	5.7
-M 97	1					97	60	—	21.2	32	—			3.9	10.7	2.9	8.7
-225-M 97	2				225		28	62		36	50		280	4.5	11	2.6	8.3






CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S	
BT50-SLSB8-110-M 42	1	8	13	2.5	110	42	30	—	17.4	32	—	24	165	3.7	7.7	2.2	2.1	○
-135-M 67					135	67			20				190		9.8	2.7	3.5	○
-140-M 42					140	42	60		17.4				195	3.8	7.6	2.1	2.4	○
-165-M 67					165	67			20				220	3.9	9.8	2.6	4	○
-M 97						97	30		23.2					3.8	12.4	3.4	5.3	○
-170-M 42	2				170	42		60	17.4				225	4.3	7.9	1.9	2.4	○
-195-M 67					195	67			20				250		10.1	2.5	4	○
-M 97	1					97	60	—	23.2					4	12.3	3.2	6.1	○
-M127						127	30		26.3					3.9	14.9	4	7.1	○
-225-M 97	2				225	97		60	23.2				280	4.4	12.6	3	6	○
-M127	1					127	60	—	26.3					4	14.9	3.9	8.2	○
-M157						157	30		29.5	42					17.5	4.6	8	○
-255-M127	2				255	127		60	26.3	32	46		310	4.5	15.2	3.5	8.1	▲
-M157	1					157	60	—	29.5	42	—			4.3	17.5	4.3	8.5	○
-285-M157	2				285		28	62			56		340	4.9	17.8	3.8		○
-SLRB8- 90-M 22	1	8	18	5	90	22	30	—	20.3	32	—	24	145	3.7	6	1.7	0.7	—
-110-M 42					110	42			22.4				165		7.7	2.2	1.1	○
-120-M 22					120	22	60		20.3				175	3.8	5.9	1.6	0.9	—
-135-M 67					135	67	30		25				190		9.8	2.7	1.7	○
-140-M 42					140	42	60		22.4				195	3.9	7.7	2.1	1.4	○
-150-M 22	2				150	22	30	60	20.3				205	4.3	6.2	1.5	0.9	—
-165-M 67	1				165	67	60	—	25				220	4	9.8	2.6	2.2	○
-170-M 42	2				170	42	28	62	22.4	36	50		225	4.5	8	1.9	1.3	○
-195-M 67					195	67	30	60	25	32	46		250	4.4	10.1	2.4	2.2	○
-SLFB8- 90-M 22	1	8	18	5	90	22	30	—	20.3	32	—	24	145	3.7	6	1.7	0.7	—
 -110-M 42					110	42			22.4				165		7.7	2.2	1.1	○
-120-M 22					120	22	60		20.3				175	3.8	5.9	1.6	0.9	—
-135-M 67					135	67	30		25				190		9.8	2.7	1.7	○
-140-M 42					140	42	60		22.4				195	3.9	7.7	2.1	1.4	○
-150-M 22	2				150	22	30	60	20.3				205	4.3	6.2	1.5	0.9	—
-165-M 67	1				165	67	60	—	25				220	4	9.8	2.6	2.2	○
-170-M 42	2				170	42	30	60	22.4				225	4.3	8	1.9	1.4	○
-195-M 67					195	67			25				250	4.4	10.1	2.4	2.2	○
-SLSA8-165 CV	3	8	11	1.5	165	127	—	—	85	—	—	24	220	4.9	14.7	3.1	1.4	○
-195 CV					195	157							250	5.3	16.1	3.2	1.9	○
-225 CV					225	187							280	5.8	17.7	3.2	2.3	○
-255 CV					255	217							310		17.9	3.2	3.7	▲
-285 CV					285	247							340	6	19.1	3.3	4.9	○
-315 CV					315	277							370	8.4	28	3.5	5	○
-SLRA8-195 CV	3	8	16	4	195	157	—	—	85	—	—	24	250	5.4	17.3	3.4	1.1	○
-225 CV					225	187							280	5.6	18.3	3.4	1.5	○
-255 CV					255	217							310	5.8	19.1	3.4	2.2	▲
-285 CV					285	247							340	5.9	19.9	3.5	3	○
-SLFA8-195 CV	3	8	16	4	195	157	—	—	85	—	—	24	250	5.4	17.3	3.4	1.1	○
 -225 CV					225	187							280	5.6	18.3	3.4	1.5	○
-255 CV					255	217							310	5.8	19.1	3.4	2.2	▲
-285 CV					285	247							340	5.9	19.9	3.5	3	○

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S	
BT50-SLSA10-110-M 42	1	10	13	1.5	110	42	30	—	17.4	25	—	30	165	3.6	7.9	2.3	2.6	○
-135-M 67					135	67			20	32			190	3.7	10.4	2.9	4	○
-140-M 42					140	42	60		17.4	25			195		7.8	2.2	3.7	○
-165-M 67					165	67			20	32			220	3.9	10.4	2.8	4.6	○
-M 97						97	30		23.2					3.8	13.6	3.7	6	○
-170-M 42	2				170	42	33	57	17.4	25	39		225	4	8.1	2.1	3.5	○
-195-M 67					195	67	28	62	20	36	50		250	4.5	10.7	2.5	4.3	○
-M 97	1					97	60	—	23.2	32	—			3.9	13.5	3.6	6.9	○
-225-M 97	2				225		30	60			46		280	4.4	13.8	3.3	6.8	▲
-SLSB10-110-M 42	1	10	16	3	110	42	30	—	20.4	32	—	30	165	3.7	8.6	2.4	1.4	○
-135-M 67					135	67			23				190	3.8	11.7	3.2	2.4	○
-140-M 42					140	42	60		20.4				195	3.9	8.6	2.3	1.8	○
-165-M 67					165	67			23				220		11.7	3.1	3	○
-M 97						97	30		26.2						15.4	4.1	3.7	○
-170-M 42	2				170	42	28	62	20.4	36	50		225	4.5	8.9	2.1	1.7	○
-195-M 67					195	67	30	60	23	32	46		250	4.3	12	2.9	3	○
-M 97	1					97	60	—	26.2		—			4	15.3	4	4.5	○
-M127						127	30		29.3	42					20	5.2		○
-225-M 97	2				225	97		60	26.2	32	46		280	4.4	15.6	3.7	4.4	▲
-M127	1					127	60	—	29.3	42	—			4.2	20.6	5.1	4.9	○
-M157						157	30		32.5					4.1	23.7	6.1	5.6	○
-255-M127	2				255	127	28	62	29.3		56		310	4.8	21.1	4.6	4.9	○
-M157	1					157	60	—	32.5		—			4.4	24.3	5.8	6.1	○
-285-M157	2				285		28	62			56		340	5	24.8	5.2		○
-SLRB10- 90-M 22	1	10	22	6	90	22	30	—	24.3	32	—	30	145	3.7	6.2	1.8	0.6	—
-110-M 42					110	42			26.4				165	3.8	8.7	2.4	0.8	○
-120-M 22					120	22	60		24.3				175	3.9	6.2	1.7		—
-135-M 67					135	67	30		29	42			190		11.8	3.2	1.1	○
-140-M 42					140	42	60		26.4	32			195		8.6	2.3	1.2	○
-150-M 22	2				150	22	30	60	24.3		46		205	4.3	6.5	1.6	0.8	—
-165-M 67	1				165	67	60	—	29	42	—		220	4.1	11.7	3	1.3	○
-170-M 42	2				170	42	28	62	26.4	36	50		225	4.5	8.9	2.1	1	○
-195-M 67					195	67		62	29	42	56		250	4.7	12	2.7	1.3	○
-SLFB10- 90-M 22	1	10	22	6	90	22	30	—	24.3	32	—	30	145	3.7	6.2	1.8	0.6	—
-110-M 42					110	42			26.4				165	3.8	8.7	2.4	0.8	○
-120-M 22					120	22	60		24.3				175	3.9	6.2	1.7		—
-135-M 67					135	67	30		29	42			190		11.8	3.2	1.1	○
-140-M 42					140	42	60		26.4	36			195	4	8.6	2.3	1	○
-150-M 22	2				150	22	30	60	24.3	32	46		205	4.3	6.5	1.6	0.8	—
-165-M 67	1				165	67	60	—	29	42	—		220	4.1	11.7	3	1.3	○
-170-M 42	2				170	42	28	62	26.4	36	50		225	4.5	8.9	2.1	1	○
-195-M 67					195	67		62	29	42	56		250	4.7	12	2.7	1.3	○
-SLSA10-165 CV	3	10	13	1.5	165	127	—	—	85	—	—	30	220	4.9	14.9	3.2	1.2	○
-195 CV					195	157							250	5.5	16.9	3.2	1.5	○
-225 CV					225	187							280	5.4	16.8	3.3	2.4	▲
-255 CV					255	217							310	6.1	19.8	3.4	2.6	○
-285 CV					285	247							340	6.3	21.2	3.5	3.7	○
-315 CV					315	277							370	8.4	28.6	3.6	4.6	○

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S	
BT50-SLRA10-165 CV	3	10	19	4.5	165	127	—	—	85	—	—	30	220	5.1	15.9	3.3	0.7	—
-195 CV					195	157	—	—	85	—	—	30	250	5.2	16.6	3.3	1.1	○
-225 CV					225	187	—	—	85	—	—	30	280	5.9	19.7	3.5	1.2	▲
-255 CV					255	217	—	—	85	—	—	30	310	6.1	20.3	3.5	1.7	—
-285 CV					285	247	—	—	85	—	—	30	340	6.2	21.1	3.6	2.4	—
-SLFA10-165 CV	3	10	19	4.5	165	127	—	—	85	—	—	30	220	5.1	15.9	3.3	0.7	—
-195 CV					195	157	—	—	85	—	—	30	250	5.2	16.6	3.3	1.1	○
-225 CV					225	187	—	—	85	—	—	30	280	5.9	19.7	3.5	1.2	▲
-255 CV					255	217	—	—	85	—	—	30	310	6.1	20.3	3.5	1.7	—
-285 CV					285	247	—	—	85	—	—	30	340	6.2	21.1	3.6	2.4	—
BT50-SLSA12-110-M 42	1	12	15	1.5	110	42	30	—	19.4	32	—	30	165	3.7	9.5	2.7	1.9	○
-135-M 67					135	67	—	—	22	—	—	30	190	3.8	13.1	3.7	3.3	—
-140-M 42					140	42	60	—	19.4	—	—	30	195	3.8	9.4	2.6	2.3	—
-165-M 67					165	67	—	—	22	—	—	30	220	3.9	13	3.5	3.9	—
-M 97					—	97	30	—	25.2	—	—	30	—	3.8	17.7	4.9	4.9	—
-170-M 42					2	170	42	—	60	19.4	—	46	225	4.3	9.7	2.4	2.3	—
-195-M 67					195	67	—	—	22	—	—	250	—	13.3	3.2	3.9	—	
-M 97					1	—	97	60	—	25.2	—	—	4	17.7	4.6	5.9	—	
-225-M 97					2	225	—	30	60	—	—	46	280	4.4	18	4.3	5.8	▲
-SLSB12-110-M 42	1	12	19	3.5	110	42	30	—	23.4	32	—	30	165	3.7	10.4	2.9	1.1	○
-135-M 67					135	67	—	—	26	—	—	30	190	3.8	14.6	4	1.9	—
-140-M 42					140	42	60	—	23.4	—	—	30	195	3.9	10.3	2.8	1.6	—
-165-M 67					165	67	—	—	26	—	—	30	220	—	14.5	3.9	2.5	—
-M 97					—	97	30	—	29.2	42	—	30	—	20.5	5.5	2.4	—	
-170-M 42					2	170	42	28	62	23.4	36	50	225	4.5	10.6	2.5	1.3	—
-195-M 67					195	67	30	60	26	32	46	250	4.4	14.8	3.5	2.4	—	
-M 97					1	—	97	60	—	29.2	42	—	—	4.2	21.1	5.3	2.7	—
-M127					—	127	30	—	32.3	—	—	—	—	4.1	25.5	6.5	3.3	—
-225-M 97					2	225	97	28	62	29.2	—	56	280	4.8	21.6	4.7	2.8	▲
-M127					1	—	127	60	—	32.3	—	—	—	4.3	26.1	6.4	3.7	—
-M157					—	157	30	—	35.5	—	—	—	—	30.6	7.5	4.1	—	
-255-M127					2	255	127	28	62	32.3	—	56	310	4.9	26.7	5.7	3.7	—
-M157	1	—	157	60	—	35.5	—	—	—	4.5	31.1	7.2	4.7	—				
-285-M157	2	285	—	28	62	—	—	56	340	5.1	31.7	6.5	—					
-SLRB12- 90-M 22	1	12	26	7	90	22	30	—	28.3	42	—	30	145	3.7	9.5	2.7	0.4	—
-110-M 42					110	42	—	—	30.4	—	—	30	165	3.8	11.4	3.1	0.6	—
-120-M 22					120	22	60	—	28.3	—	—	30	175	4	10.1	2.6	0.5	—
-135-M 67					135	67	30	—	33	—	—	30	190	—	15.5	4.1	0.8	—
-140-M 42					140	42	60	—	30.4	—	—	30	195	4.1	11.9	3	0.7	—
-150-M 22					2	150	22	28	62	28.3	—	56	205	4.6	10.7	2.4	0.5	—
-165-M 67					1	165	67	60	—	33	—	—	220	4.2	16.1	4	1	—
-170-M 42					2	170	42	28	62	30.4	—	56	225	4.7	12.5	2.8	0.7	—
-195-M 67					195	67	—	—	33	—	—	30	250	4.8	16.7	3.6	1.1	—
-SLFB12- 90-M 22	1	12	26	7	90	22	30	—	28.3	42	—	30	145	3.7	9.5	2.7	0.4	—
-110-M 42					110	42	—	—	30.4	—	—	30	165	3.8	11.4	3.1	0.6	—
-120-M 22					120	22	60	—	28.3	—	—	30	175	4	10.1	2.6	0.5	—
-135-M 67					135	67	30	—	33	—	—	30	190	—	15.5	4.1	0.8	—
-140-M 42					140	42	60	—	30.4	—	—	30	195	4.1	11.9	3	0.7	—
-150-M 22					2	150	22	28	62	28.3	—	56	205	4.6	10.7	2.4	0.5	—
-165-M 67					1	165	67	60	—	33	—	—	220	4.2	16.1	4	1	—
-170-M 42					2	170	42	28	62	30.4	—	56	225	4.7	12.5	2.8	0.7	—
-195-M 67					195	67	—	—	33	—	—	30	250	4.8	16.7	3.6	1.1	—

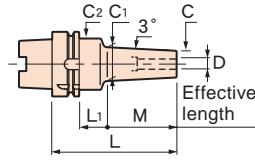
CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S				
BT50-SLSA12-165 CV	3	12	15	1.5	165	127	—	—	84	—	—	30	220	4.8	14.6	3.2	1.2				
-195 CV					195	157	—	—	85	—	—		250	5.6	17.6	3.3					
-225 CV					225	187	—	—	—	—	—		280	5.8	18.5	3.3	1.8				
-255 CV					255	217	—	—	—	—	—		310	6	19.3	3.4	2.6				
-285 CV					285	247	—	—	—	—	—		340	6.2	21.2	3.6	3.5				
-315 CV					315	277	—	—	—	—	—		370	8.5	29.2	3.6	3.6				
-SLRA12-165 CV	3	12	22	5	165	127	—	—	85	—	—	30	220	5.1	16.1	3.3	0.7				
-195 CV					195	157	—	—	—	—	250		5.6	18	3.4	0.8					
-225 CV					225	187	—	—	—	—	280		—	18.6	3.5	1.3					
-255 CV					255	217	—	—	—	—	310		5.8	20.7	3.7	1.6					
-285 CV					285	247	—	—	—	—	340		6.1	22.4	3.8	2.1					
-SLFA12-165 CV	3	12	22	5	165	127	—	—	85	—	—	30	220	5.1	16.1	3.3	0.7				
-195 CV					195	157	—	—	—	—	250		5.6	18	3.4	0.8					
-225 CV					225	187	—	—	—	—	280		—	18.6	3.5	1.3					
-255 CV					255	217	—	—	—	—	310		5.8	20.7	3.7	1.6					
-285 CV					285	247	—	—	—	—	340		6.1	22.4	3.8	2.1					
BT50-SLSB16-110-M 42	1	16	24	4	110	42	30	—	28.4	42	—	32	165	3.8	15	4.1	0.7				
-135-M 67					135	67	—	—	31	—	—		190	3.9	21.9	5.9	1.1				
-140-M 42	2	16	24	4	140	42	60	—	28.4	—	—	32	195	4	15.6	4.1	0.9				
-165-M 67					165	67	—	—	31	—	—		220	4.1	22.5	5.7	1.4				
-M 97	2	16	24	4	—	97	30	—	34.2	—	—	32	—	4	30.2	7.9	1.7				
-170-M 42					170	42	28	62	28.4	—	56		225	4.6	16.2	3.7	0.9				
-195-M 67	1	16	24	4	195	67	—	—	31	—	—	32	250	4.7	23	5.1	1.4				
-M 97					—	97	60	—	34.2	—	—		—	4.3	30.7	7.5	2				
-M127	2	16	24	4	127	30	—	—	37.3	53	—	32	—	4.2	38.5	9.6	2.1				
-225-M 97					225	97	28	62	34.2	42	56		280	4.9	31.3	6.7					
-M127	1	16	24	4	127	60	—	—	37.3	53	—	32	—	4.6	39	8.9	2.3				
-M157					157	30	—	—	40.5	—	—		—	4.4	46.8	11.1	2.6				
-255-M127	2	16	24	4	255	127	28	62	37.3	—	—	32	310	5.5	39.6	7.5	2.3				
-M157					—	157	60	—	40.5	—	—		—	4.8	47.3	10.3	2.8				
-285-M157	2	16	24	4	285	—	28	62	—	—	—	32	340	5.7	47.9	8.8	2.9				
-SLRB16- 90-M 22	1	16	32	8	90	22	30	—	34.3	42	—	32	145	3.8	9.6	2.6	0.3				
-110-M 42					110	42	—	—	36.4	—	—		165	3.9	15.1	4.1	0.5				
-120-M 22					120	22	60	—	34.3	—	—		175	4	10.1	2.6					
-135-M 67					135	67	30	—	39	—	—		190	4.1	22	5.6	0.6				
-140-M 42					140	42	60	—	36.4	—	—		195	4.2	15.7	3.9					
-150-M 22					2	16	32	8	150	22	28		62	34.3	—	56	205	4.6	10.7	2.4	0.5
-165-M 67					1	16	32	8	165	67	60		—	39	—	—	220	4.3	22.6	5.5	0.9
-170-M 42					2	16	32	8	170	42	28		62	36.4	—	56	225	4.8	16.2	3.5	0.7
-195-M 67					—	16	32	8	195	67	—		—	39	—	—	250	4.9	23.2	5	0.9
-SLFB16- 90-M 22	1	16	32	8	90	22	30	—	34.3	42	—	32	145	3.8	9.6	2.6	0.3				
-110-M 42					110	42	—	—	36.4	—	—		165	3.9	15.1	4.1	0.5				
-120-M 22					120	22	60	—	34.3	—	—		175	4	10.1	2.6					
-135-M 67					135	67	30	—	39	—	—		190	4.1	22	5.6	0.6				
-140-M 42					140	42	60	—	36.4	—	—		195	4.2	15.7	3.9					
-150-M 22					2	16	32	8	150	22	28		62	34.3	—	56	205	4.6	10.7	2.4	0.5
-165-M 67					1	16	32	8	165	67	60		—	39	—	—	220	4.3	22.6	5.5	0.9
-170-M 42					2	16	32	8	170	42	28		62	36.4	—	56	225	4.8	16.2	3.5	0.7
-195-M 67					—	16	32	8	195	67	28		—	39	—	—	250	4.9	23.2	5	0.9
-SLSB16-165 CV	3	16	21	2.5	165	127	—	—	85	—	—	32	220	5.4	17.8	3.5	0.6				
-195 CV					195	157	—	—	—	—	—		250	—	17.7	3.4	1.1				
-225 CV					225	187	—	—	—	—	—		280	6.3	21.1	3.5	1.2				
-255 CV					255	217	—	—	—	—	—		310	6.1	20.9	3.6	2				
-285 CV					285	247	—	—	—	—	—		340	7	24.3	3.6					
-315 CV					315	277	—	—	—	—	—		370	8.6	30.9	3.8	2.6				



CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h			G grade	
BT50-SLSB20-110-M 42	1	20	29	4.5	110	42	30	—	33.4	42	—	40	165	3.8	16.8	4.6	0.5
-135-M 67					135	67			36				190	3.9	27.1	7.3	0.9
-140-M 42					140	42	60		33.4				195	4.1	17.4	4.4	0.8
-165-M 67					165	67			36				220	4.2	27.7	6.9	1.2
-M 97						97	30		39.2	53				4.1	39.4	10.1	1.1
-170-M 42	2				170	42	28	62	33.4	42	56		225	4.7	18	4	0.8
-195-M 67					195	67			36				250	4.8	28.2	6.2	1.2
-M 97	1					97	60	—	39.2	53	—			4.5	40	9.3	1.3
-M127						127	30		42.3					4.3	52.6	12.8	1.5
-225-M 97	2				225	97	28	62	39.2		67		280	5.4	40.6	7.9	1.3
-M127	1					127	60	—	42.3		—			4.7	53.2	11.9	1.8
-M157						157	30		45.5					4.6	65	14.8	1.7
-255-M127	2				255	127	28	62	42.3		67		310	5.6	53.7	10	
-M157	1					157	60	—	45.5		—			5	65.5	13.7	2.2
-285-M157	2				285		28	62			67		340	5.9	66.1	11.7	
-SLRB20-110-M 42	1	20	38	9	110	42	30	—	42.4	53	—	40	165	4	16.9	4.4	0.3
-135-M 67					135	67			45				190	4.2	27.2	6.8	0.4
-140-M 42					140	42	60		42.4				195	4.4	17.5	4.2	
-165-M 67					165	67			45				220	4.6	27.8	6.3	0.6
-170-M 42	2				170	42	28	62	42.4		67		225	5.3	18.1	3.6	0.4
-195-M 67					195	67			45				250	5.5	28.4	5.4	0.6
-SLFB20-110-M 42	1	20	38	9	110	42	30	—	42.4	53	—	40	165	4	16.9	4.4	0.3
 -135-M 67					135	67			45				190	4.2	27.2	6.8	0.4
-140-M 42					140	42	60		42.4				195	4.4	17.5	4.2	
-165-M 67					165	67			45				220	4.6	27.8	6.3	0.6
-170-M 42	2				170	42	28	62	42.4		67		225	5.3	18.1	3.6	0.4
-195-M 67					195	67			45				250	5.5	28.4	5.4	0.6
-SLSB20-165 cv	3	20	26	3	165	127	—	—	85	—	—	40	220	5.4	17.4	3.4	0.6
-195 cv					195	157							250	6.1	20.8	3.6	0.7
-225 cv					225	187							280	5.8	20.5	3.7	1.2
-255 cv					255	217							310	6.7	23.9	3.7	1.3
-285 cv					285	247							340	7	25.4	3.8	1.7
-315 cv					315	277							370	8.9	32.4	3.8	2.3
BT50-SLRB25-110-M 42	1	25	45	10	110	42	30	—	49.6	53	—	45	165	4.1	19	4.9	0.3
-140-M 42					140		60						195	4.5	19.6	4.6	0.4
-170-M 42	2				170		28	62			67			5.3	20.2	4	
SLFB25-110-M 42	1	25	45	10	110	42	30	—	49.6	53	—	45	165	4.1	19	4.9	0.3
 -140-M 42					140		60						195	4.5	19.6	4.6	0.4
-170-M 42	2				170		28	62			67			5.4	20.2	3.9	

A40

A40-SLRA10-65


















Compatibility table for HRD-01S
 [O] Available [—] Not available

Std.Access.
 • Coolant duct (fixed type), (HSK-A) →p.106

Note
 • Swing type coolant ducts are available upon request. →P.106

Caution
 • Setting cutters...Be sure to insert the tool beyond the safety mark.

CODE	φD	φC	t	L	M	L1	φC1	φC2	H	h	Kg	N	G grade	s		
A40-SLSA 3- 60-M22	3	6	1.5	60	22	18	8.3	20	9	44	0.2	1.3	13.6	4.8	○	
- 65-M22				65		23				25						0.3
- 85-M42				85		42	10.4	64		3.2	22.3	9.1				
-100-M42				100		38	78	3.3		23	9.3					
-SLRA 3- 65-M22	3	7.5	2.25	65	22	23	9.8	25	9	44	0.3	3	20.9	2.7	○	
- 85-M42				85		42				11.9						64
-SLFB 3- 65-M22	3	9.5	3.25	65	22	23	11.8	25	9	44	0.3	3	20.9	1.2	○	
- 85-M42				85		42				13.9						64
A40-SLSA 4- 60-M22	4	7	1.5	60	22	18	9.3	20	12	44	0.2	1.4	14.7	3.8	○	
- 65-M22				65		23				25						0.3
- 80-M42				80		42	18	11.4		20	64	0.2	1.4	14.7		7.5
- 85-M42				85		23	25	0.3		3.4	23.7	7.1				
-100-M42				100		38	78	3.5		24.4	7.4					
-SLRA 4- 65-M22	4	10	3	65	22	23	12.3	25	12	44	0.3	3.1	21.6	1.7	○	
- 85-M42				85		42				14.4						64
-SLFB 4- 65-M22	4	12	4	65	22	23	14.3	25	12	44	0.3	3.2	22.3	1.3	○	
- 85-M42				85		42				16.4						64
A40-SLSA 6- 65-M22	6	9	1.5	65	22	23	11.3	25	18	44	0.3	3.2	22.3	2.3	○	
- 80-M42				80		42				18						13.4
- 85-M42				85		23	25	64		0.3	3.9	27.2	4.8			
-100-M42				100		38	78	4		27.9	5.1					
-SLRA 6- 60-M22	6	12	3	60	22	18	14.3	26	18	39	0.3	1.4	9.8	1.3	○	
- 65-M22				65		23				25						44
- 85-M42				85		42	16.4	64		3.9	27.2	2.4				
-SLFB 6- 70-M22	6	14	4	70	22	28	16.3	32	18	48	0.4	4.1	21.5	1	○	
- 90-M42				90		42				18.4						68
A40-SLSA 8- 65-M22	8	11	1.5	65	22	23	13.3	25	24	44	0.3	3.2	22.3	1.6	○	
- 70-M22				70		28				26						49
- 85-M42				85		42	23	15.4		25	64	4.3	30	3.4		
-100-M42				100		38	78	4.4		30.7	3.8					
-SLRA 8- 60-M22	8	14	3	60	22	18	16.3	26	20	39	0.3	1.5	10.5	1	○	
- 65-M22				65		23				25						24
- 85-M42				85		42	18.4	64		4.3	30	2				
-SLFB 8- 70-M22	8	18	5	70	22	28	20.3	32	24	48	0.4	4.1	21.5	0.7	○	
- 90-M42				90		42				22.4						68

CODE	ϕ D	ϕ C	t	L	M	L ₁	ϕ C ₁	ϕ C ₂	H	h			G grade					
A40-SLSA10- 65-M22	10	13	1.5	65	22	23	15.3	25	30	44	0.3	3	20.9	1.2				
- 85-M42				85	42		17.4		64	4.6						32.1	2.6	
- 90-M42				90		28		26		1.9						13.3		
-100-M42				100		38		25		4.7						32.8	3	
-SLRA10- 65-M22	10	16	3	65	22	23	18.3	26	25	44	0.3	1.6	11.2	0.9				
- 65-M22								25	30							3	20.9	1
- 90-M42								90	42	28						20.4	32	69
-SLFB10- 70-M22	10	22	6	70	22	28	24.3	32	30	48	0.4	3.9	20.4	0.6				
 - 90-M42				90	42		26.4									68	0.5	5.6
A40-SLSA12- 65-M22	12	15	1.5	65	22	23	17.3	25	30	44	0.3	3.3	23	1.1				
- 90-M42				90	42	28	19.4	32	68	0.4						6.1	31.9	1.9
 -SLRA12- 65-M22	12	20	4	65	22	23	22.3	25	30	44	0.3	3.3	23	0.8				
 -SLFB12- 70-M22	12	26	7	70	22	28	28.3	32	30	48	0.4	4.2	22	0.6				
A40-SLRA16- 65-M22	16	26	5	65	22	23	28.3	33.5	32	43	0.4	2	10.5	0.5				
A40-SLRA20- 70-M50	20	32	6	70	50	-	33.5	-	38	48	0.4	2.4	12.6	0.6				

Feature

Shrink-fit Heater

MONO 3°
MONO CURVE

MONO Series

2PIECE type

UNO

HYPER
VERSION

Z

STRAIGHT
arbor

OTHERS

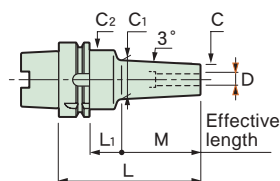
PERIPHERALS

Technical
data

A50



A50-SLSA4-95-M42



Compatibility table for HRD-01S
 [O] Available [-] Not available

Std.Access.
 • Coolant duct (fixed type), (HSK-A) →p.106

Note
 • Swing type coolant ducts are available upon request. →P.106

Caution
 • Setting cutters ··Be sure to insert the tool beyond the safety mark.

CODE	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg	N	G _{grade}	S							
A50-SLSA 3- 95-M42	3	6	1.5	95	42	27	10.4	25	9	71	0.5	5.8	24.3	9.1	○						
-125-M42				125		57				101						0.6	6.5	22.7	9.8		
-SLRA 3- 75-M22	3	7.5	2.25	75	22	27	9.8	25	9	51	0.5	6.2	26	2.8	○						
- 95-M42				95						42						11.9	71	6.6	27.6	5.3	
-125-M42				125						57						101	0.6	7.3	25.5	6	
A50-SLSA 4- 95-M42	4	7	1.5	95	42	27	11.4	25	12	71	0.5	7	29.3	7.2	○						
-125-M42				125		57				101						0.6	7.7	26.9	7.9		
-SLRA 4- 75-M22	4	10	3	75	22	27	12.3	25	12	51	0.5	6.3	26.4	1.7	○						
- 95-M42				95						42						14.4	71	7	29.3	3.1	
-125-M42				125						57						101	0.6	7.7	26.9	3.8	
A50-SLSA 6- 95-M42	6	9	1.5	95	42	27	13.4	25	18	71	0.5	7.3	30.6	4.8	○						
-125-M42				125		57				101						0.6	8	27.9	5.6		
-SLRB 6- 75-M22	6	14	4	75	22	27	16.3	32	18	50	0.5	7.2	30.2	1	○						
- 95-M42				95						42						18.4	70	0.6	8.9	31.1	1.6
-125-M42				125						57						100	0.7	10.2	30.5	1.9	
A50-SLSA 8- 95-M42	8	11	1.5	95	42	27	15.4	25	24	71	0.5	9.3	39	3.4	○						
-125-M42				125		57				101						0.6	11.8	41.2	4.4		
-SLRB 8- 75-M22	8	18	5	75	22	27	20.3	32	24	50	0.6	7.9	27.6	0.7	-						
- 95-M42				95						42						22.4	70	10.5	36.6	1.1	
-125-M42				125						57						100	0.8	11.8	30.9	1.5	
A50-SLSA10- 95-M42	10	13	1.5	95	42	27	17.4	25	30	71	0.5	10.7	44.8	2.6	○						
-125-M42				125		57				101						0.6	12.1	42.2	3.7		
-SLRB10- 75-M22	10	22	6	75	22	27	24.3	32	30	50	0.6	8.3	29	0.6	-						
- 95-M42				95						42						26.4	70	11.9	41.5	0.9	
-125-M42				125						57						100	0.8	13.3	34.8	1.3	
A50M-SLRB12- 75-M22	12	26	7	75	22	27	28.3	42	30	52	0.7	6.2	18.5	0.4	-						
A50 -SLRB12- 95-M42				95						42						30.4	72	0.8	6.3	16.5	0.6
-125-M42				125						57						98	1	22.9	48	0.8	
A50M-SLRB16- 75-M22	16	32	8	75	22	27	34.3	42	32	52	0.7	6.3	18.8	0.4	○						
A50 -SLRB16-105-M22				105		22				57						34.3	42	32	78	1	19
A50M-SLRB20- 75-M22	20	38	9	75	22	27	40.3	49	40	51	0.8	6.4	16.8	0.3	○						
105-M22				105						57						76	1.2	15.1	26.4	0.4	

MAKINO J
 MAKINO J3

A63

A63-SLRB12-95-M42

MONO 3°

Rigidity value (μm/kgf) → P.118
 Imbalance value(g·mm) (N) → P.121
 G_{grade}(20000 min⁻¹)

Fig. 1

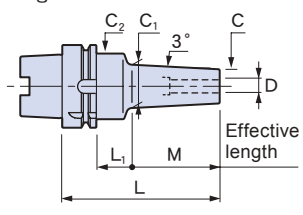
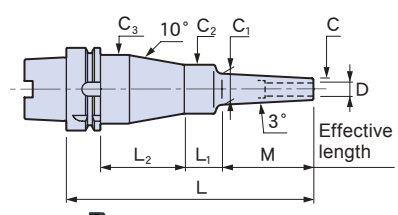


Fig. 2

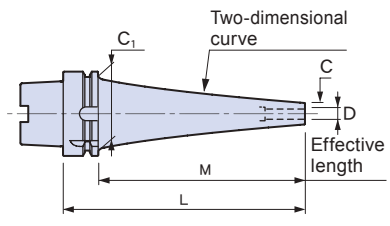


MONO CURVE

A63-SLFA6-150 cv

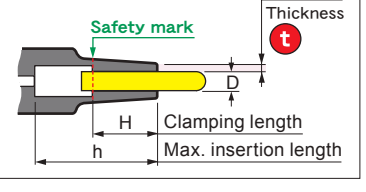
Rigidity value (μm/kgf) → P.118
 Imbalance value(g·mm) (N) → P.121
 G_{grade}(20000 min⁻¹)

Fig. 3



Compatibility table for HRD-01S
 [○] Available [—] Not available
 [▲] Usable by raising the heating unit. → P.117
 [★] Use heating coil No. 2.

Std. Access.
 • Coolant duct (fixed type), (HSK-A) → p.106
 Note
 • Swing type coolant ducts are available upon request. → P.106
 Caution
 • Setting cutters · · Be sure to insert the tool beyond the safety mark.





CV: Curve













Thickness








20000 min⁻¹

CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h	Kg	N	G _{grade}	S
A63-SLSA3- 95-M 42	1	3	6	1.5	95	42	27	—	10.4	25	—	9	70	0.7	8.1	24.2	9.1
-120-M 67					120	67			13				95	0.8	9.2	24.1	14.7
-125-M 42					125	42	57		10.4	26			100	0.9	8.2	19.1	9.6
-150-M 67					150	67			13	25			125	0.8	9.3	24.3	15.8
-M 97						97	27		16.2						10.5	27.5	20.5
-155-M 42	2				155	42	33	54	10.4	26	40		130	1.2	8.4	14.7	9.9
-180-M 67					180	67			13	25	39		155	1.1	9.6	18.3	15.7
-M 97	1					97	57	—	16.2		—			0.9	10.6	24.7	22.2
-210-M 97	2				210		33	54		25	39		185	1.2	10.8	18.8	22.1
-SLRA3- 75-M 22	1	3	7.5	2.25	75	22	27	—	9.8	25	—	9	50	0.7	8.4	25.1	2.8
- 95-M 42					95	42			11.9				70		8.9	26.6	5.3
-105-M 22					105	22	57		9.8				80	0.8	8.6	22.5	3.2
-120-M 67					120	67	27		14.5				95		9.6	25.1	8.8
-125-M 42					125	42	57		11.9				100		9	23.6	6
-135-M 22	2				135	22	33	54	9.8		39		110	1.1	8.8	16.8	3.2
-150-M 67	1				150	67	57	—	14.5		—		125	0.9	9.8	22.8	9.9
-M 97						97	27		17.7					0.8	10.6	27.7	12.9
-155-M 42	2				155	42	33	54	11.9	26	40		130		9.2	24.1	6
-180-M 67					180	67			14.5				155	1.2	10	17.5	9.8
-M 97	1					97	57	—	17.7	25	—			0.9	10.8	25.1	14.6
-M127						127	27		20.8	36					12.6	29.3	15.7
-210-M 97	2				210	97	33	54	17.7	26	40		185	1	11	23	14.3
-M127	1					127	57	—	20.8	32	—		184	1.1	12.8	24.4	16.6
-240-M127	2				240		30	57			46		214	1.5	13.2	18.4	16.5





CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S
A63-SLFB3- 75-M 22	1	3	9.5	3.25	75	22	27	—	11.8	25	—	9	50	0.7	8.1	24.2	1.9
 - 95-M 42					95	42			13.9				70	0.8	8.5	22.3	3.2
-105-M 22					105	22	57		11.8	26			80	0.9	8.2	19.1	2.3
-120-M 67					120	67	27		16.5				95	0.8	9.7	25.4	5.3
-125-M 42					125	42	57		13.9				100	0.9	8.7	20.2	3.8
-135-M 22	2				135	22	33	54	11.8		40		110	1.2	8.5	14.8	2.3
-150-M 67	1				150	67	57	—	16.5		—		125	0.9	9.8	22.8	6.3
-155-M 42	2				155	42	33	54	13.9	25	39		130	1.1	8.9	16.9	3.9
-180-M 67					180	67			16.5	26	40		155	1.2	10	17.5	6.3
A63-SLSA4- 95-M 42	1	4	7	1.5	95	42	27	—	11.4	25	—	12	70	0.7	9.2	27.5	7.2
-120-M 67					120	67			14				95	0.8		24.1	11.7
-125-M 42					125	42	57		11.4				100		9.4	24.6	7.9
-150-M 67					150	67			14				125	0.9		21.9	12.8
-M 97					97	27			17.2					0.8	10.6	27.7	16.6
-155-M 42	2				155	42	33	54	11.4		39		130	1.1	9.6	18.3	7.9
-180-M 67					180	67			14				155			18.3	12.8
-M 97	1				97	57	—		17.2		—			0.9	10.8	25.1	18.4
-210-M 97	2				210		33	54			39		185	1.2	11	19.2	18.2
-SLRA4- 75-M 22	1	4	10	3	75	22	27	—	12.3	25	—	12	50	0.7	8.6	25.7	1.7
- 95-M 42					95	42			14.4				70	0.8	9.2	24.1	3.1
-105-M 22					105	22	57		12.3				80		8.7	22.8	2.2
-120-M 67					120	67	27		17				95		10.3	27	5.1
-125-M 42					125	42	57		14.4				100		9.3	24.3	3.8
-135-M 22	2				135	22	33	54	12.3		39		110	1.1	8.9	16.9	2.2
-150-M 67	1				150	67	57	—	17		—		125	0.9	10.4	24.2	6.3
-M 97					97	27			20.2				124	0.8	11.7	30.6	7.7
-155-M 42	2				155	42	33	54	14.4		39		130	1.1	9.6	18.3	3.8
-180-M 67					180	67			17				155	1.2	10.7	18.7	6.2
-M 97	1				97	57	—		20.2		—		154	0.9	11.8	27.5	9.5
-M127					127	27			23.3	32				1	14.8	31	9.4
-210-M 97	2				210	97	33	54	20.2	26	40		185	1.3	12.1	19.5	9.1
-M127	1				127	57	—		23.3	36	—			1.2	15.1	26.4	9.9
-240-M127	2				240		30	57		32	46		214	1.5	15.4	21.5	10.3
-SLFB4- 75-M 22	1	4	12	4	75	22	27	—	14.3	25	—	12	50	0.7	8.4	25.1	1.3
 - 95-M 42					95	42			16.4				70	0.8	9	23.6	2.2
-105-M 22					105	22	57		14.3				80		8.5	22.3	1.8
-120-M 67					120	67	27		19				95		10.3	27	3.6
-125-M 42					125	42	57		16.4				100	0.9	9.1	21.2	2.9
-135-M 22	2				135	22	33	54	14.3		39		110	1.1	8.7	16.6	1.8
-150-M 67	1				150	67	57	—	19		—		125	0.9	10.4	24.2	4.7
-155-M 42	2				155	42	33	54	16.4		39		130	1.1	9.4	17.9	2.9
-180-M 67					180	67			19				155	1.2	10.6	18.5	4.6
-SLSA 4- 90 CV	3	4	7	1.5	90	64	—	—	53	—	—	12	65	1	9.3	19.5	1.8
-120 CV					120	94							95	1.1	10.1	19.2	2.7
-150 CV					150	124							125	1.3	11	17.7	4
-180 CV					180	154							154	1.4	11.6	17.4	6.6
-210 CV					210	184							185		11.8	17.7	11.6
-240 CV					240	214							214	1.6	13.1	17.1	14
-270 CV					270	244							245	2	15.4	16.1	11.9
-300 CV					300	274							275	2.1	16.3	16.3	15.9
-SLRA 4-120 CV	3	4	10	3	120	94	—	—	53	—	—	12	95	1	8.6	18	1.9
-150 CV					150	124							125	1.1	9.3	17.7	2.9
-180 CV					180	154							155	1.4	10.9	16.3	3.3
-210 CV					210	184							185		11.3	16.9	5.6

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lbs	N	G grade	S	
A63-SLSA3/16- 90 CV	3	3/16	.31	.06	3.54	2.52	—	—	2.87	—	—	.59	2.56	1.9	7.6	18.5	2	
-120 CV					4.72	3.70	—	—					3.74	2.2	8.5	17.8	2.6	
-150 CV					5.91	4.88	—	—					4.92	2.5	9.4	17.4	4.	
-180 CV					7.09	6.06	—	—					6.06	2.7	10.3	17.6	6.5	
-210 CV					8.27	7.24	—	—					7.24	3.1	11.8	17.6	8.4	
-240 CV					9.45	8.43	—	—					8.43	3.5	12.9	17	10.6	
-270 CV					10.63	9.61	—	—					9.61	4.0	14.2	16.4	13.2	
-300 CV					11.81	10.79	—	—					10.83	4.5	15.1	15.5	16.1	
-SLRA3/16-120 CV	3	3/16	.42	.12	4.72	3.70	—	—	2.87	—	—	.59	3.70	2.2	8.7	18.3	1.8	
-150 CV					5.91	4.88	—	—					4.88	2.6	10	17.8	2.4	
-180 CV					7.09	6.06	—	—					6.10	2.8	10.2	16.8	4.3	
-210 CV					8.27	7.24	—	—					7.24	3.1	12	17.9	5.7	
A63-SLSA6- 95-M 42	1	6	9	1.5	95	42	27	—	13.4	25	—	18	70	0.7	9.5	28.4	4.8	
-120-M 67					120	67	—	—	16	—	—		95	0.8	11.1	29.1	8	
-125-M 42					125	42	57	—	13.4	—	—		100	—	9.7	25.4	5.6	
-150-M 67					150	67	—	—	16	—	—		125	0.9	11.2	26.1	9.3	
-M 97					—	97	27	—	19.2	32	—		124	—	13.4	31.2	11	
-155-M 42					2	155	42	33	54	13.4	25		39	130	1.1	9.9	18.8	5.6
-180-M 67						180	67	—	—	16	—		—	155	—	11.5	21.9	9.2
-M 97					1	—	97	57	—	19.2	32		—	154	1	13.6	28.5	11.7
-210-M 97					2	—	210	—	30	57	—		—	184	1.4	14	20.9	—
-SLSB6- 95-M 42	1	6	10	2	95	42	27	—	14.4	25	—	18	70	0.7	10.5	31.4	3.7	
-120-M 67					120	67	—	—	17	—	—		95	0.8	12.6	33	6.2	
-125-M 42					125	42	57	—	14.4	—	—		100	—	10.6	27.7	4.5	
-150-M 67					150	67	—	—	17	—	—		125	0.9	12.7	29.6	7.4	
-M 97					—	97	27	—	20.2	32	—		124	—	15.4	35.8	8.5	
-155-M 42					2	155	42	33	54	14.4	25		39	130	1.1	10.9	20.8	4.4
-180-M 67						180	67	—	—	17	—		—	155	—	12.9	24.6	7.3
-M 97					1	—	97	57	—	20.2	32		—	154	1	15.7	32.9	9.2
-M127						—	127	27	—	23.3	—		—	—	0.9	17.9	41.7	11
-210-M 97					2	—	210	97	30	57	20.2		—	184	1.4	16	23.9	9.2
-M127						1	—	127	57	—	23.3		—	—	1.1	18.2	34.7	12
-M157					—		157	27	—	26.5	—		—	—	20.4	38.8	13.2	—
-240-M127					2	—	240	127	30	57	23.3		46	214	1.5	18.5	25.8	12
-M157						1	—	157	57	—	26.5		—	—	1.2	20.7	36.1	14.6
-270-M157					2		—	270	—	30	57		—	46	244	1.6	21	27.5
-SLRB6- 75-M 22	1	6	14	4	75	22	27	—	16.3	32	—	18	49	0.8	9.3	24.3	1	
- 95-M 42					95	42	—	—	18.4	—	—		69	—	10.9	28.5	1.6	
-105-M 22					105	22	57	—	16.3	—	—		79	0.9	9.5	22.1	1.2	
-120-M 67					120	67	27	—	21	—	—		94	—	13	30.3	2.6	
-125-M 42					125	42	57	—	18.4	—	—		99	1	11.2	23.5	1.9	
-135-M 22					2	135	22	30	57	16.3	—		46	109	1.3	9.9	15.9	1.2
-150-M 67						1	150	67	57	—	21		—	124	1	13.2	27.6	3
-155-M 42					2		155	42	30	57	18.4		—	46	129	1.4	11.5	17.2
-180-M 67						—	180	67	—	—	21		—	—	154	—	13.6	20.3
-SLFB6- 75-M 22					1	6	14	4	75	22	27		—	16.3	32	—	18	49
- 95-M 42	95	42	—	—					18.4	—	—	69	—	10.9	28.5	1.6		
-105-M 22	105	22	57	—					16.3	—	—	79	0.9	9.5	22.1	1.2		
-120-M 67	120	67	27	—					21	—	—	94	—	13	30.3	2.6		
-125-M 42	125	42	57	—					18.4	—	—	99	1	11.2	23.5	1.9		
-135-M 22	2	135	22	30					57	16.3	—	46	109	1.3	9.9	15.9		1.2
-150-M 67		1	150	67					57	—	21	—	124	1	13.2	27.6		3
-155-M 42	2		155	42					30	57	18.4	—	46	129	1.4	11.5		17.2
-180-M 67		—	180	67					—	—	21	—	—	154	—	13.6		20.3






CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h					
A63-SLSA 6- 90 CV	3	6	9	1.5	90	64	—	—	53	—	—	18	65	1	9.4	19.7	1.6	○
-120 CV					120	94	95	1.1					10.1	19.2	2.3			
-150 CV					150	124	125	1.3					11	17.7	3.6			
-180 CV					180	154	154	1.4					11.7	17.5	5.7			
-210 CV					210	184	184	1.6					13	17	7.3			
-240 CV					240	214	214	—					13.3	17.4	12			
-270 CV					270	244	245	2.1					16.3	16.3	8.5			
-300 CV					300	274	275	2.3					17.2	15.7	11.7			
-SLRA 6- 90 CV	3	6	13	3.5	90	64	—	—	53	—	—	18	65	1	8.3	17.4	0.8	★
-120 CV					120	94	95	1.1					9.3	17.7	1.2			
-150 CV					150	124	125	1.3					10.1	16.3	1.9			
-180 CV					180	154	155	1.4					11.1	16.6	2.8			
-210 CV					210	184	185	—					11.5	17.2	4.8			
 -210 CV					210	184	185	—					11.5	17.2	4.8			
-SLFA 6- 90 CV	3	6	13	3.5	90	64	—	—	53	—	—	18	65	1	8.3	17.4	0.8	★
-120 CV					120	94	95	1.1					9.3	17.7	1.2			
-150 CV					150	124	125	1.3					10.1	16.3	1.9			
-180 CV					180	154	155	1.4					11.1	16.6	2.8			
-210 CV					210	184	185	—					11.5	17.2	4.8			
 -210 CV					210	184	185	—					11.5	17.2	4.8			
A63-SLSA1/4- 90 CV	3	1/4	.37	.06	3.54	2.52	—	—	2.87	—	—	.71	2.56	1.9	7.7	18.7	1.6	○
-120 CV					4.72	3.70	3.74	2.2					8.5	17.8	2.4			
-150 CV					5.91	4.88	4.92	2.5					9.4	17.4	3.7			
-180 CV					7.09	6.06	6.10	2.8					10.4	17.1	5.5			
-210 CV					8.27	7.24	7.24	3.1					12.1	18	7.5			
-240 CV					9.45	8.43	8.43	3.5					13.2	17.4	9.6			
-270 CV					10.63	9.61	9.65	4.1					14.2	16	11.3			
-300 CV					11.81	10.79	10.79	4.7					16.9	16.6	11.8			
 -300 CV					11.81	10.79	10.79	4.7					16.9	16.6	11.8			
-SLRA1/4- 90 CV	3	1/4	.53	.14	3.54	2.52	—	—	2.87	—	—	.71	2.52	2.1	8.4	18.5	0.8	○
-120 CV					4.72	3.70	3.74	2.5					9.2	17	1.2			
-150 CV					5.91	4.88	4.92	2.8					10.2	16.8	1.9			
-180 CV					7.09	6.06	6.06	3.1					11.6	17.3	2.9			
-210 CV					8.27	7.24	7.24	3.2					12.2	17.6	4.9			
 -210 CV					8.27	7.24	7.24	3.2					12.2	17.6	4.9			
-SLFA1/4- 90 CV	3	1/4	.53	.14	3.54	2.52	—	—	2.87	—	—	.71	2.52	2.1	8.4	18.5	0.8	○
-120 CV					4.72	3.70	3.74	2.5					9.2	17	1.2			
-150 CV					5.91	4.88	4.92	2.8					10.2	16.8	1.9			
-180 CV					7.09	6.06	6.06	3.1					11.6	17.3	2.9			
-210 CV					8.27	7.24	7.24	3.2					12.2	17.6	4.9			
 -210 CV					8.27	7.24	7.24	3.2					12.2	17.6	4.9			
A63-SLSA8- 95-M 42	1	8	11	1.5	95	42	27	—	15.4	25	—	24	70	0.7	11.4	34.1	3.4	○
-120-M 67					120	67	—	18	32	94	0.8		14	36.6	5.4			
-125-M 42					125	42	57	15.4	25	100	—		11.6	30.4	4.3			
-150-M 67					150	67	—	18	32	124	1		14.2	29.7	5.9			
-M 97					—	97	27	21.2	—	—	0.9		17.1	39.8	7.9			
-155-M 42					2	155	42	33	54	15.4	25		39	130	1.1	12	22.8	4.3
-180-M 67					180	67	30	57	18	32	46		154	1.4	14.6	21.8	5.9	
-M 97					1	—	97	57	—	21.2	—		—	1	17.4	36.4	8.7	
-210-M 97					2	210	—	30	57	—	—		46	184	1.4	17.7	26.5	
 -210-M 97					2	210	—	30	57	—	—		46	184	1.4	17.7	26.5	
-SLSB8- 95-M 42	1	8	13	2.5	95	42	27	—	17.4	32	—	24	69	0.8	12.5	32.7	2.1	○
-120-M 67					120	67	—	20	—	94	0.9		15.7	36.5	3.5			
-125-M 42					125	42	57	17.4	—	99	1		12.7	26.6	2.4			
-150-M 67					150	67	—	20	—	124	—		15.9	33.3	4			
-M 97					—	97	27	23.2	—	—	0.9		19.5	45.4	5.2			
-155-M 42					2	155	42	30	57	17.4	—		46	129	1.4	13.1	19.6	2.4
-180-M 67					180	67	—	20	—	154	—		16.3	24.4	4			
-M 97					1	—	97	57	—	23.2	—		—	1.1	19.8	37.7	6	
-M127					—	127	27	26.3	—	—	1		23.4	49.0	7			
-210-M 97					2	210	97	30	57	23.2	—		46	184	1.5	20.2	28.2	6
 -210-M 97	2	210	97	30	57	23.2	—	46	184	1.5	20.2	28.2	6					
-M127	1	—	—	—	127	27	—	26.3	—	—	—	185	—	—	27.3	47.6	8	○
-240-M127					240	127	30	57	26.3	32	46		214	1.6	24	31.4	8.1	
-M157					—	157	27	—	29.5	42	—		—	1.5	27.5	38.4	8.6	
-240-M127	2	—	—	—	240	127	30	57	26.3	32	46	214	1.6	24	31.4	8.1	▲	
-M157					—	157	27	—	29.5	42	—		—	1.5	27.5	38.4	8.6	
-270-M157	2	—	—	—	270	—	28	59	—	—	53	242	2	27.9	29.2	8.7	▲	

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h			G grade		
A63-SLRB8- 75-M 22	1	8	18	5	75	22	27	—	20.3	32	—	24	49	0.8	10	26.2	0.7	—
- 95-M 42					95	42			22.4				69	0.9	12.5	29.1	1.1	○
-105-M 22					105	22	57		20.3				79	1	10.2	21.4	0.9	—
-120-M 67					120	67	27		25				94	0.9	15.7	36.5	1.7	○
-125-M 42					125	42	57		22.4				99	1	12.8	26.8	1.4	
-135-M 22	2				135	22	30	57	20.3		46		109	1.4	10.6	15.9	1	—
-150-M 67	1				150	67	57	—	25		—		124	1.1	16	30.5	2.2	○
-155-M 42	2				155	42	30	57	22.4		46		129	1.4	13.2	19.7	1.4	
-180-M 67					180	67			25				155	1.5	16.4		2.2	
-SLFB8- 75-M 22	1	8	18	5	75	22	27	—	20.3	32	—	24	49	0.8	10	26.2	0.7	—
 - 95-M 42					95	42			22.4				69	0.9	12.5	29.1	1.1	○
-105-M 22					105	22	57		20.3				79	1	10.2	21.4	0.9	—
-120-M 67					120	67	27		25				94	0.9	15.7	36.5	1.7	○
-125-M 42					125	42	57		22.4				99	1	12.8	26.8	1.4	
-135-M 22	2				135	22	30	57	20.3		46		109	1.4	10.6	15.9	1	—
-150-M 67	1				150	67	57	—	25		—		124	1.1	16	30.5	2.2	○
-155-M 42	2				155	42	30	57	22.4		46		129	1.4	13.2	19.7	1.4	
-180-M 67					180	67			25				154	1.5	16.4	22.9	2.2	
-SLSA 8- 90 CV	3	8	11	1.5	90	64	—	—	53	—	—	24	65	1	9.4	19.7	1.4	○
-120 CV					120	94							94	1.1	10.3	19.6	2	
-150 CV					150	124							124	1.3	11.5	18.5	2.7	
-180 CV					180	154							155	1.4	11.8	17.7	5	
-210 CV					210	184							184	1.6	13.2	17.3	6.6	▲
-240 CV					240	214							214	1.8	14.4	16.8	8.3	
-270 CV					270	244							244	2.2	17.2	16.4	6.9	
-300 CV					300	274							274	2.4	18.5	16.1	8.9	
-SLRA 8- 90 CV	3	8	16	4	90	64	—	—	53	—	—	24	65	1	8.4	17.6	0.7	○
-120 CV					120	94							95	1.2	9.6	16.8	1	
-150 CV					150	124							125	1.4	10.8	16.2	1.4	
-180 CV					180	154							155	1.5	12	16.8	2	
-210 CV					210	184							185	1.6	12.5	16.4	3.5	
-SLFA 8- 90 CV	3	8	16	4	90	64	—	—	53	—	—	24	65	1	8.4	17.6	0.7	○
 -120 CV					120	94							95	1.2	9.6	16.8	1	
-150 CV					150	124							125	1.4	10.8	16.2	1.4	
-180 CV					180	154							155	1.5	12	16.8	2	
-210 CV					210	184							185	1.6	12.5	16.4	3.5	
A63-SLSA5/16- 90 CV	3	5/16	.43	.06	3.54	2.52	—	—	2.87	—	—	.94	2.56	1.9	7.7	18.7	1.5	○
-120 CV					4.72	3.70							3.70	2.2	8.9	18.7	2	
-150 CV					5.91	4.88							4.88	2.6	10.2	18.1	2.8	
-180 CV					7.09	6.06							6.10	2.7	10.4	17.8	5.2	
-210 CV					8.27	7.24							7.17	3.1	13.6	20.3	6	
-240 CV					9.45	8.43							8.43	3.8	14.5	17.6	6.8	▲
-270 CV					10.63	9.61							9.65	4.4	15.1	15.8	8.5	
-300 CV					11.81	10.79							10.79	5.0	18.1	16.7	9	
-SLRA5/16- 90 CV	3	5/16	.63	.16	3.54	2.52	—	—	2.87	—	—	.94	2.52	2.1	8.4	18.5	0.7	○
-120 CV					4.72	3.70							3.70	2.6	9.8	17.4	1	
-150 CV					5.91	4.88							4.88	3.0	11.1	17.1	1.5	
-180 CV					7.09	6.06							6.06	3.4	12.5	17	2.1	
-210 CV					8.27	7.24							7.24	3.5	13.4	17.7	3.6	
-SLFA5/16- 90 CV	3	5/16	.63	.16	3.54	2.52	—	—	2.87	—	—	.94	2.52	2.1	8.4	18.5	0.7	○
 -120 CV					4.72	3.70							3.70	2.6	9.8	17.4	1	
-150 CV					5.91	4.88							4.88	3.0	11.1	17.1	1.5	
-180 CV					7.09	6.06							6.06	3.4	12.5	17	2.1	
-210 CV					8.27	7.24							7.24	3.5	13.4	17.7	3.6	

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G _{grade}	S	
A63-SLSA10- 95-M 42	1	10	13	1.5	95	42	27	—	17.4	25	—	30	70	0.8	12.8	33.5	2.6	○
-120-M 67					120	67			20	32			94		16.6	43.5	4	
-125-M 42					125	42	57		17.4	25			100		13	34	3.6	
-150-M 67					150	67			20	32			124	1	16.9	35.4	4.6	
-M 97						97	27		23.2					0.9	21.3	49.6	6	
-155-M 42	2				155	42	33	54	17.4	25	39		130	1.1	13.4	25.5	3.5	
-180-M 67					180	67	30	57	20	32	46		154	1.4	17.3	25.9	4.6	
-M 97	1					97	57	—	23.2	36	—		153	1.2	21.6	37.7	6.4	
-210-M 97	2				210		30	57		32	46		184	1.5	21.9	30.6	6.9	
-SLSB10- 95-M 42	1	10	16	3	95	42	27	—	20.4	32	—	30	69	0.8	13.9	36.4	1.4	○
-120-M 67					120	67			23				94	0.9	18.5	43	2.4	
-125-M 42					125	42	57		20.4				99	1	14.2	29.7	1.8	
-150-M 67					150	67			23				124		18.8	39.4	3	
-M 97						97	27		26.2						24	50.3	3.6	
-155-M 42	2				155	42	28	59	20.4	36	50		128	1.6	14.6	19.1	1.7	
-180-M 67					180	67	30	57	23	32	46		154	1.4	19.2	28.7	3	
-M 97	1					97	57	—	26.2		—			1.1	24.3	46.3	4.5	
-M127						127	27		29.3	42			155	1.2	30.2	52.7		
-210-M 97	2				210	97	28	59	26.2	36	50		180	1.7	24.7	30.4	4.1	
-M127	1					127	57	—	29.3	42	—		182	1.4	31	46.4	4.9	
-M157						157	27		32.5				185	1.3	35.7	57.5	5.6	
SLRB10- 75-M 22	1	10	22	6	75	22	27	—	24.3	32	—	30	49	0.8	10.3	27	0.6	—
- 95-M 42					95	42			26.4				68	0.9	14	32.6	0.8	○
-105-M 22					105	22	57		24.3				79	1	10.6	22.2		—
-120-M 67					120	67	27		29	42			94	1.1	18.6	35.4	1.1	○
-125-M 42					125	42	57		26.4	32			99		14.2	27	1.2	
-135-M 22	2				135	22	30	57	24.3		46		109	1.4	10.9	16.3	0.9	—
-150-M 67	1				150	67	57	—	29	42	—		124	1.3	18.9	30.4	1.3	○
-155-M 42	2				155	42	30	57	26.4	32	46		129	1.5	14.6	20.4	1.2	
-180-M 67					180	67	28	59	29	42	53		154	1.8	19.2	22.3	1.3	
-SLFB10- 75-M 22	1	10	22	6	75	22	27	—	24.3	32	—	30	49	0.8	10.3	27	0.6	—
- 95-M 42					95	42			26.4				69	0.9	14	32.6	0.8	○
-105-M 22					105	22	57		24.3	36			78	1.1	10.6	20.2	0.7	—
-120-M 67					120	67	27		29	42			94		18.6	35.4	1.1	○
-125-M 42					125	42	57		26.4	32			99		14.2	27	1.2	
-135-M 22	2				135	22	30	57	24.3		46		109	1.4	10.9	16.3	0.9	—
-150-M 67	1				150	67	57	—	29	42	—		124	1.3	18.9	30.4	1.3	○
-155-M 42	2				155	42	30	57	26.4	32	46		129	1.5	14.6	20.4	1.2	
-180-M 67					180	67	28	59	29	42	53		154	1.8	19.2	22.3	1.3	
-SLSA10- 90 CV	3	10	13	1.5	90	64	—	—	53	—	—	30	65	1	9.4	19.7	1.3	○
-120 CV					120	94							95	1.3	10.9	17.6		
-150 CV					150	124							125	1.4	11.8	17.7	2.2	
-180 CV					180	154							154	1.6	12.9	16.9	3.4	
-210 CV					210	184							184		13.3	17.4	6	
-240 CV					240	214							212	2.1	16	16	5.8	▲
-270 CV					270	244							244		17.5	17.5	6.6	
-300 CV					300	274							274	2.3	18.7	17	8.6	
-SLRA10- 90 CV	3	10	19	4.5	90	64	—	—	53	—	—	30	65	1	8.5	17.8	0.6	○
-120 CV					120	94							95	1.2	9.6	16.8	0.9	
-150 CV					150	124							125	1.3	10.9	17.6	1.4	
-180 CV					180	154							155	1.5	12.1	16.9	2	
-210 CV					210	184							185	1.6	13.3	17.4	3.1	

CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h									
A63-SLFA10- 90 CV	3	10	19	4.5	90	64	—	—	53	—	—	30	65	1	8.5	17.8	0.6	○				
 -120 CV					120	94	—	—					95	1.2	9.6	16.8	0.9	○				
-150 CV					150	124	—	—					125	1.3	10.9	17.6	1.4	○				
-180 CV					180	154	—	—					155	1.5	12.1	16.9	2	○				
-210 CV					210	184	—	—					185	1.6	13.3	17.4	3.1	○				
A63-SLSA3/8- 90 CV	3	3/8	.49	.06	3.54	2.52	—	—	2.87	—	—	1.18	2.56	1.9	7.7	18.7	1.3	○				
-120 CV					4.72	3.70	—	—					3.74	2.2	8.7	18.3	2.2	○				
-150 CV					5.91	4.88	—	—					4.88	2.6	10.4	18.5	2.6	○				
-180 CV					7.09	6.06	—	—					6.06	3.0	11.8	18.2	3.6	○				
-210 CV					8.27	7.24	—	—					7.24	3.4	13.4	18.2	4.9	○				
-240 CV					9.45	8.43	—	—					8.46	4.0	14.2	16.4	6	▲				
-270 CV					10.63	9.61	—	—					9.61	4.5	17.1	17.5	6.8	▲				
-300 CV					11.81	10.79	—	—					10.79	5.0	18.5	17.1	8.8	▲				
-SLRA3/8- 90 CV	3	3/8	.73	.185	3.54	2.52	—	—	2.87	—	—	1.18	2.52	2.1	8.4	18.5	0.7	○				
-120 CV					4.72	3.70	—	—					3.70	2.6	9.7	17.2	1	○				
-150 CV					5.91	4.88	—	—					4.88	3.0	11.2	17.2	1.4	○				
-180 CV					7.09	6.06	—	—					6.06	3.4	12.7	17.2	2	○				
-210 CV					8.27	7.24	—	—					7.28	3.8	13.2	16	2.9	○				
-SLFA3/8- 90 CV	3	3/8	.73	.185	3.54	2.52	—	—	2.87	—	—	1.18	2.52	2.1	8.4	18.5	0.7	○				
 -120 CV					4.72	3.70	—	—					3.70	2.6	9.7	17.2	1	○				
-150 CV					5.91	4.88	—	—					4.88	3.0	11.2	17.2	1.4	○				
-180 CV					7.09	6.06	—	—					6.06	3.4	12.7	17.2	2	○				
-210 CV					8.27	7.24	—	—					7.28	3.8	13.2	16	2.9	○				
A63-SLSA12- 95-M 42	1	12	15	1.5	95	42	27	—	19.4	32	—	30	69	0.8	15.2	39.8	1.8	○				
-120-M 67					120	67	—	—					94	—	20.6	53.9	3.3	○				
-125-M 42					125	42	57	—					99	1	15.4	32.3	2.3	○				
-150-M 67					150	67	—	—					124	—	20.8	43.6	3.9	○				
-M 97					—	97	27	—					—	0.9	27.5	64	4.9	○				
-155-M 42					2	155	42	30					57	19.4	—	46	129	1.4	15.8	23.6	2.3	○
-180-M 67						180	67	—					—	22	—	154	—	21.2	31.7	3.9	○	
-M 97					1	—	97	57					—	25.2	—	—	—	1.1	27.8	52.9	5.8	○
-210-M 97	2	210	—	30	57	—	—	46	184	1.5	28.2	39.4	—	▲								
-SLSB12- 95-M 42	1	12	19	3.5	95	42	27	—	23.4	32	—	30	69	0.8	16.5	43.2	1.1	○				
-120-M 67					120	67	—	—					94	0.9	22.8	53.1	1.8	○				
-125-M 42					125	42	57	—					99	1	16.8	35.2	1.5	○				
-150-M 67					150	67	—	—					124	1.1	23.1	44	2.5	○				
-M 97					—	97	27	—					125	—	30.9	58.8	2.4	○				
-155-M 42					2	155	42	30					57	23.4	32	46	129	1.4	17.2	25.7	1.6	○
-180-M 67						180	67	—					—	26	—	154	1.5	23.4	32.7	2.5	○	
-M 97					1	—	97	57					—	29.2	42	—	152	1.4	31.7	47.4	2.8	○
-M127						—	127	27					—	32.3	—	—	155	1.3	38.5	62	3.3	○
-210-M 97						210	97	87					—	29.2	50	—	180	1.9	32.6	35.9	2.8	▲
-M127						—	127	57					—	32.3	—	—	—	1.7	39.3	48.4	3.5	○
-M157					—	157	27	—					35.5	42	—	—	185	1.4	46	68.8	4.1	○
-240-M127	2	240	127	87	—	32.3	50	—	215	2.1	40.1	40	3.8	○								
-M157		—	157	57	—	35.5	—	—	—	1.9	46.8	51.6	4.3	○								
-270-M157	2	270	—	28	59	—	—	42	53	2.2	47.7	45.4	4.8	○								

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lbs	N	G grade	S
A63-SLRB12- 75-M 22	1	12	26	7	75	22	27	—	28.3	42	—	30	50	0.9	14.5	33.7	0.4
- 95-M 42					95	42			30.4				70	1	17.2	36	0.6
-105-M 22					105	22	57		28.3				77	1.2	15.3	26.7	0.5
-120-M 67					120	67	27		33				95		23.5	41	0.8
-125-M 42					125	42	57		30.4				97	1.3	18	29	0.7
-135-M 22	2				135	22	28	59	28.3		53		107	1.7	16.2	20	0.6
-150-M 67	1				150	67	57	—	33	42	—		122	1.4	24.3	36.4	1.1
-155-M 42					155	42	87		30.4	50			125	1.8	18.9	22	0.8
-180-M 67	2				180	67	28	59	33	42	53		152	1.9	25.2	27.8	1.1
-SLFB12- 75-M 22	1	12	26	7	75	22	27	—	28.3	42	—	30	50	0.9	14.5	33.7	0.4
- 95-M 42					95	42			30.4				70	1	17.2	36	0.6
-105-M 22					105	22	57		28.3				77	1.2	15.3	26.7	0.5
-120-M 67					120	67	27		33				95		23.5	41	0.8
-125-M 42					125	42	57		30.4				97	1.3	18	29	0.7
-135-M 22	2				135	22	28	59	28.3		53		107	1.7	16.2	20	0.6
-150-M 67	1				150	67	57	—	33	42	—		122	1.4	24.3	36.4	1.1
-155-M 42					155	42	86		30.4	50			125	1.8	18.9	22	0.8
-180-M 67	2				180	67	28	59	33	42	53		152	1.9	25.2	27.8	1.1
-SLSA12- 90 CV	3	12	15	1.5	90	64	—	—	53	—	—	30	64	1.1	9.9	18.8	0.9
-120 CV					120	94							94	1.3	11.3	18.2	1.2
-150 CV					150	124							124	1.4	11.8	17.7	2.4
-180 CV					180	154							154	1.6	13	17	3.3
-210 CV					210	184							184	1.8	14.3	16.6	4.6
-240 CV					240	214							212	2.1	16.2	16.2	5.5
-270 CV					270	244							244	2.3	18.4	16.8	5.4
-SLRA12- 90 CV	3	12	22	5	90	64	—	—	53	—	—	30	64	1	8.5	17.8	0.6
-120 CV					120	94							94	1.3	10.4	16.8	0.7
-150 CV					150	124							124	1.5	11.7	16.3	1.1
-180 CV					180	154							154		12.8	17.9	1.8
-210 CV					210	184							184	1.6	14	18.3	2.8
-SLFA12- 90 CV	3	12	22	5	90	64	—	—	53	—	—	30	64	1	8.5	17.8	0.6
-120 CV					120	94							94	1.3	10.4	16.8	0.7
-150 CV					150	124							124	1.5	11.7	16.3	1.1
-180 CV					180	154							154		12.8	17.9	1.8
-210 CV					210	184							184	1.6	14	18.3	2.8
A63-SLSA1/2- 90 CV	3	1/2	.62	.06	3.54	2.52	—	—	2.87	—	—	1.18	2.52	2.1	8.4	18.5	0.8
-120 CV					4.72	3.70							3.70	2.5	10	18.5	1.2
-150 CV					5.91	4.88							4.88		10.9	20.1	2.4
-180 CV					7.09	6.06							6.06	2.9	12.4	19.7	3.4
-210 CV					8.27	7.24							7.17	3.5	16.3	21.5	3.6
-240 CV					9.45	8.43							8.35	4.0	19.1	22	4.3
-270 CV					10.63	9.61							9.53	4.7	20.9	20.5	5.1
-SLRA1/2- 90 CV	3	1/2	.89	.20	3.54	2.52	—	—	2.87	—	—	1.18	2.44	2.2	9.3	19.5	0.5
-120 CV					4.72	3.70							3.70	2.8	10.6	17.5	0.7
-150 CV					5.91	4.88							4.88	3.2	12.1	17.5	1.1
-180 CV					7.09	6.06							5.98		15.5	22.4	1.9
-210 CV					8.27	7.24							7.24	4.4	15.7	16.5	2
-SLFA1/2- 90 CV	3	1/2	.89	.20	3.54	2.52	—	—	2.87	—	—	1.18	2.44	2.2	9.3	19.5	0.5
-120 CV					4.72	3.70							3.70	2.8	10.6	17.5	0.7
-150 CV					5.91	4.88							4.88	3.2	12.1	17.5	1.1
-180 CV					7.09	6.06							5.98		15.5	22.4	1.9
-210 CV					8.27	7.24							7.24	4.4	15.7	16.5	2

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	 Kg lbs	 N	 G grade	 S
A63-SLSB16- 95-M 42	1	16	24	4	95	42	27	—	28.4	42	—	32	70	1	22.7	47.5	0.7
-120-M 67					120	67			31				95	1.1	33	62.8	1.1
-125-M 42					125	42	57		28.4				97	1.2	23.5	41	0.9
-150-M 67					150	67			31				122	1.3	33.8	54.5	1.4
-M 97						97	27		34.2				125	1.2	45.5	79.4	1.7
-155-M 42					155	42	87		28.4	50			130	1.7	24.4	30.1	0.9
-180-M 67	2				180	67	28	59	31	42	53		152	1.8	34.7	40.4	1.5
-M 97	1					97	57	—	34.2		—			1.4	46.3	69.3	2.1
-M127					127	27			37.3	53			155	1.5	57.9	80.8	
-210-M 97					210	97	87		34.2	50			185	2	47.1	49.3	
-M127						127	57		37.3	53			181	1.9	58.7	64.7	2.3
-M157						157	27		40.5				185	1.7	70.3	86.6	2.7
-240-M127					240	127	87		37.3				211	2.3	59.5	54.2	2.6
-M157						157	57		40.5	50			215	2.1	71.1	70.9	3.1
-270-M157					270		87						245	2.4	72	62.8	3.5
-SLRB16- 75-M 22	1	16	32	8	75	22	27	—	34.3	42	—	32	50	1	14.5	30.4	0.3
- 95-M 42					95	42			36.4				70	1.1	22.8	43.4	0.5
-105-M 22					105	22	57		34.3				77	1.2	15.3	26.7	
-120-M 67					120	67	27		39				95	1.3	33.2	53.5	0.7
-125-M 42					125	42	57		36.4				97		23.6	38	
-135-M 22	2				135	22	28	59	34.3		53		107	1.7	16.2	20	0.5
-150-M 67	1				150	67	57	—	39		—		122	1.5	34	47.5	0.9
-155-M 42	2				155	42	28	59	36.4		53		127	1.9	24.5	27	0.7
-180-M 67					180	67			39				152	2	34.9	36.5	1
-SLFB16- 75-M 22	1	16	32	8	75	22	27	—	34.3	42	—	32	50	1	14.5	30.4	0.3
 - 95-M 42					95	42			36.4				70	1.1	22.8	43.4	0.5
-105-M 22					105	22	57		34.3				77	1.2	15.3	26.7	
-120-M 67					120	67	27		39				95	1.3	33.2	53.5	0.7
-125-M 42					125	42	57		36.4				97		23.6	38	
-135-M 22	2				135	22	28	59	34.3		53		107	1.7	16.2	20	0.5
-150-M 67	1				150	67	57	—	39	50	—		120		34	41.9	0.7
-155-M 42					155	42	86		36.4				125	1.9	24.5	27	
-180-M 67	2				180	67	28	59	39	42	53		152	2	34.9	36.5	1
-SLSB16- 90 CV	3	16	21	2.5	90	64	—	—	53	—	—	32	62	1.1	10.5	20	0.6
-120 CV					120	94							92	1.5	12.4	17.3	0.8
-150 CV					150	124							122	1.6	13.5	17.7	1.5
-180 CV					180	154							152	1.9	15.4	17	1.9
-210 CV					210	184							182	2.1	16.5	16.5	3
-240 CV					240	214							212	2.4	18.4	16.1	3.7
-270 CV					270	244							242	2.7	20.3	15.7	4.6
A63-SLSB5/8- 90 CV	3	5/8	.82	.10	3.54	2.52	—	—	2.87	—	—	1.26	2.44	2.1	9.3	20.4	0.6
-120 CV					4.72	3.70							3.62	2.6	11.7	20.8	0.8
-150 CV					5.91	4.88							4.80	2.9	13.4	21.3	1.5
-180 CV					7.09	6.06							5.98	3.4	15.8	21.5	1.9
-210 CV					8.27	7.24							7.17	3.6	17.5	22.4	3
-240 CV					9.45	8.43							8.35	4.2	19.9	21.9	3.7
-270 CV					10.63	9.61							9.53	4.8	22.3	21.4	4.6

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lbs	N	G grade	S
A63-SLSB20- 95-M 42	1	20	29	4.5	95	42	27	—	33.4	42	—	40	70	1	25.4	53.2	0.5
-120-M 67					120	67			36				95	1.1	40.8	77.7	0.9
-125-M 42					125	42	57		33.4				97	1.2	26.2	45.7	0.8
-150-M 67					150	67			36				122	1.4	41.6	62.2	1.2
-M 97						97	27		39.2	53			125		59.3	88.7	1.1
-155-M 42					155	42	87		33.4	50			130	1.8	27.1	31.5	0.8
-180-M 67	2				180	67	28	59	36	42	53		152	1.9	42.5	46.8	1.2
-M 97	1					97	57	—	39.2	53			151	1.8	60.1	69.9	1.3
-M127						127	27		42.3				155	1.6	79.1	103.5	1.5
-210-M 97					210	97	87		39.2				181	2.2	61	58.1	1.6
-M127						127	57		42.3				2	79.9	83.7	1.8	
-M157						157	27		45.5				185	1.9	97.6	107.6	1.9
-240-M127					240	127	87		42.3	50			215	2.3	80.7	73.5	2.3
-M157						157	57		45.5	53			211		98.4	89.6	2.2
-270-M157					270		87			50			245	2.6	99.3	80	2.8
-SLRB20- 95-M 42	1	20	38	9	95	42	27	—	42.4	53	—	40	70	1.3	25.6	41.2	0.3
-120-M 67					120	67			45				95	1.5	41	57.2	0.5
-125-M 42					125	42	57		42.4				96	1.7	26.4	32.5	0.4
-150-M 67					150	67			45				121	1.9	41.8	46.1	0.6
-155-M 42					155	42	87		42.4				126	2.1	27.2	27.1	
-180-M 67					180	67			45				151	2.3	42.7	38.9	0.8
-SLFB20- 95-M 42	1	20	38	9	95	42	27	—	42.4	53	—	40	70	1.3	25.6	41.2	0.3
-120-M 67					120	67			45				95	1.5	41	57.2	0.5
-125-M 42					125	42	57		42.4				96	1.7	26.4	32.5	0.4
-150-M 67					150	67			45	50			120	1.9	41.8	46.1	0.7
-155-M 42					155	42	87		42.4				125	2	27.2	28.5	0.6
-180-M 67					180	67			45				150	2.2	42.7	40.6	0.9
-SLSB20- 90 CV	3	20	26	3	90	64	—	—	51	—	—	40	62	1.2	10.7	18.7	0.5
-120 CV					120	94			53				92	1.5	12.8	17.9	0.8
-150 CV					150	124							122	1.7	14.1	17.4	1.3
-180 CV					180	154							152	2	16.2	17	1.8
-210 CV					210	184							182	2.4	18.2	15.9	2.3
-240 CV					240	214							212	2.7	20.2	15.7	3
-270 CV					270	244							242	3.1	22.8	15.4	3.4
A63-SLSB3/4- 90 CV	3	3/4	.99	.12	3.54	2.52	—	—	2.87	—	—	1.50	2.44	2.1	9.5	20.9	0.6
-120 CV					4.72	3.70							3.62	2.6	12.2	21.7	0.8
-150 CV					5.91	4.88							4.80	2.9	14.5	23.1	1.4
-180 CV					7.09	6.06							5.98	3.4	17.1	23.2	1.8
-210 CV					8.27	7.24							7.17	3.9	19.8	23.4	2.4
-240 CV					9.45	8.43							8.35	4.5	22.4	23	3.1
-270 CV					10.63	9.61							9.53	5.0	25	23.1	3.9
A63-SLRB25- 95-M 42	1	25	45	10	95	42	27	—	49.6	53	—	45	70	1.4	28.7	42.9	0.3
-125-M 42					125		57						96	1.8	29.5	34.3	0.4
-155-M 42					155		87						126	2.2	30.4	28.9	0.6
-SLFB25- 95-M 42	1	25	45	10	95	42	27	—	49.6	53	—	45	70	1.4	28.7	42.9	0.3
-125-M 42					125		57						96	1.8	29.5	34.3	0.4
-155-M 42					155		87						126	2.2	30.4	28.9	0.6

A100

A100-SLRB20-105-M22

MONO 3°



Fig. 1

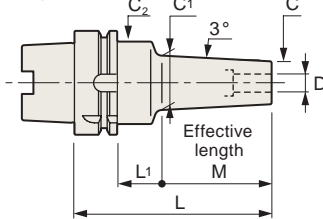
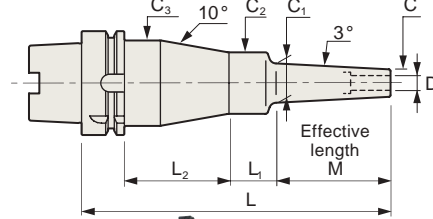


Fig. 2



Compatibility table for HRD-01S

[O] Available [-] Not available
 [▲] Usable by raising the heating unit. \rightarrow P.117

A100-SLSB16-165 cv

MONO CURVE

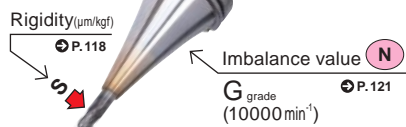
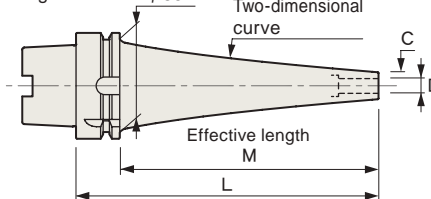


Fig. 3



Std. Access.

- Coolant duct (fixed type), (HSK-A) \rightarrow p.106

Note

- Swing type coolant ducts are available upon request. \rightarrow P.106

Caution



- Setting cutters... Be sure to insert the tool beyond the safety mark.


CV : Curve

Thickness




10000 min^{-1}

CODE	Fig.	ϕD	ϕC	t	L	M	L ₁	L ₂	ϕC_1	ϕC_2	ϕC_3	H	h	Kg	N	G _{grade}	S
A100-SLSA3-110-M 42	1	3	6	1.5	110	42	39	—	10.4	26	—	9	80	2.2	19.8	9.4	9.4
-135-M 67					135	67			13				105	2.3	20.9	9.5	15.1
-140-M 42					140	42	69		10.4				110		19.9	9.1	10.1
-165-M 67					165	67			13	25			136	2.2	21	10	16
-M 97						97	39		16.2	26			135	2.3	22.2	10.1	21
-170-M 42	2				170	42	33	66	10.4		40		140	2.6	20.2	8.2	10
-195-M 67					195	67			13				165		21.3	8.6	15.9
-M 97	1					97	69	—	16.2	25	—		166	2.3	22.3	10.2	22.5
-225-M 97	2				225		33	66		26	40		195	2.7	22.6	8.8	22.2
-SLRA3- 90-M 22	1	3	7.5	2.25	90	22	39	—	9.8	26	—	9	60	2.2	20.2	9.6	2.9
-110-M 42					110	42			11.9				80		20.6	9.8	5.5
-120-M 22					120	22	69		9.8	25			91		20.3	9.7	3.3
-135-M 67					135	67	39		14.5	26			105	2.3	21.4	9.8	9
-140-M 42					140	42	69		11.9				110		20.7	9.4	6.1
-150-M 22	2				150	22	33	66	9.8		40		120	2.6	20.6	8.3	3.2
-165-M 67	1				165	67	69	—	14.5	25	—		136	2.3	21.5	9.8	10.1
-M 97						97	39		17.7	26			135		22.4	10.2	13.1
-170-M 42	2				170	42	33	66	11.9		40		140	2.6	21	8.5	6
-195-M 67					195	67			14.5				165		21.8	8.8	9.9
-M 97	1					97	69	—	17.7		—			2.4	22.5	9.8	14.7
-M127						127	39		20.8	36					24.5	10.7	15.8
-225-M 97	2				225	97	33	66	17.7	26	40		195	2.7	22.8	8.9	14.4
-M127	1					127	69	—	20.8	36	—			2.6	24.6	9.9	16.4
-255-M127	2				255		28	71			50		225	3.2	24.9	8.2	16.3




CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lbs	N	G grade	S	
A100-SLFB3- 90-M 22	1	3	9.5	3.25	90	22	39	—	11.8	26	—	9	60	2.2	19.8	9.4	1.9	○
 -110-M 42					110	42			13.9				80	2.3	20.3	9.3	3.3	○
-120-M 22					120	22	69		11.8				90		19.9	9.1	2.3	○
-135-M 67					135	67	39		16.5				105		21.4	9.8	5.5	○
-140-M 42					140	42	69		13.9	25			111	2.2	20.4	9.7	4.1	○
-150-M 22	2				150	22	33	66	11.8	26	40		120	2.6	20.2	8.2	2.3	○
-165-M 67	1				165	67	69	—	16.5		—		135	2.4	21.5	9.4	6.5	○
-170-M 42	2				170	42	33	66	13.9		40		140	2.6	20.7	8.4	3.9	○
-195-M 67					195	67			16.5				165		21.8	8.8	6.3	○
A100-SLSA4-110-M 42	1	4	7	1.5	110	42	39	—	11.4	25	—	12	81	2.1	21	10.5	7.2	○
-135-M 67					135	67			14				106	2.2		10	11.8	○
-140-M 42					140	42	69		11.4				111		21.1	10.1	8	○
-165-M 67					165	67			14				136	2.3		9.6	13.1	○
-M 97						97	39		17.2	26			135		22.4	10.2	16.9	○
-170-M 42	2				170	42	33	66	11.4		40		140	2.6	21.4	8.6	8	○
-195-M 67					195	67			14	25	39		166				12.9	○
-M 97	1					97	69	—	17.2		—			2.3	22.5	10.3	18.7	○
-225-M 97	2				225		33	66			39		196	2.6	22.8	9.2	18.3	○
-SLRA4- 90-M 22	1	4	10	3	90	22	39	—	12.3	25	—	12	61	2.1	20.3	10.1	1.8	○
-110-M 42					110	42			14.4	26			80	2.3	21	9.6	3.2	○
-120-M 22					120	22	69		12.3	25			91	2.2	20.4	9.7	2.3	○
-135-M 67					135	67	39		17				106		22	10.5	5.3	○
-140-M 42					140	42	69		14.4				111		21.1	10.1	4	○
-150-M 22	2				150	22	33	66	12.3	26	40		120	2.6	20.7	8.4	2.2	○
-165-M 67	1				165	67	69	—	17		—		135	2.4	22.1	9.7	6.3	○
-M 97						97	39		20.2	25			136	2.2	23.5	11.2	7.9	○
-170-M 42	2				170	42	33	66	14.4	26	40		140	2.6	21.4	8.6	3.8	○
-195-M 67					195	67			17	25	39		166		22.5	9.1	6.3	○
-M 97	1					97	69	—	20.2	26	—		165	2.4	23.5	10.3	9.5	○
-M127						127	39		23.3	32			166		26.7	11.7	9.6	○
-225-M 97	2				225	97	33	66	20.2	26	40		195	2.7	23.9	9.3	9.2	○
-M127	1					127	69	—	23.3	32	—		196	2.6	26.8	10.8	10.7	○
-255-M127	2				255		30	69			46		226	3	27.2	9.5	10.4	○
-SLFB4- 90-M 22	1	4	12	4	90	22	39	—	14.3	25	—	12	61	2.1	20.1	10	1.4	○
 -110-M 42					110	42			16.4	26			80	2.3	20.8	9.5	2.3	○
-120-M 22					120	22	69		14.3	25			91	2.2	20.2	9.6	1.9	○
-135-M 67					135	67	39		19	26			105	2.3	22	10	3.7	○
-140-M 42					140	42	69		16.4	25			111		20.8	9.5	3.1	○
-150-M 22	2				150	22	33	66	14.3		39		121	2.6	20.5	8.3	1.8	○
-165-M 67	1				165	67	69	—	19	26	—		135	2.4	22.1	9.7	4.7	○
-170-M 42	2				170	42	33	66	16.4	25	39		141	2.6	21.2	8.6	2.9	○
-195-M 67					195	67			19				166		22.4	9	4.7	○
-SLSA4-165 CV	3	4	7	1.5	165	136	—	—	85	—	—	12	133	3.4	29	9	2.5	○
-195 CV					195	166							163	3.7	30.6	8.7	3.3	○
-225 CV					225	196							196	4.3	33	8.1	3.8	○
-255 CV					255	226							226	4.4	34.1		5.6	○
-285 CV					285	256							256	4.6	35.5		7.6	○
-315 CV					315	286							286	4.9	37.1	8	9.8	○
-345 CV					345	316							316	5.2	38.8	7.8	12.4	○
A100-SLSA3/16-165 CV	3	.19	.31	.06	6.50	5.35	—	—	3.35	—	—	.59	5.35	7.0	25.2	8.3	2.4	○
-195 CV					7.68	6.54							6.54	7.6	26.9	8.2	3.3	○
-225 CV					8.86	7.72							7.72	8.7	29.1	7.7	4	○
-255 CV					10.04	8.90							8.90	9.0	30		6	○
-285 CV					11.22	10.08							10.08	9.4	32.2	7.9	8.2	▲
-315 CV					12.40	11.26							11.26	10.1	33.6	7.7	10.4	○
-345 CV					13.58	12.44							12.44	10.7	35.2	7.6	13.1	○


CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg	N	G grade	S	
A100-SLSA6-110-M 42	1	6	9	1.5	110	42	39	—	13.4	25	—	18	81	2.1	21.3	10.6	4.9	▲
-135-M 67					135	67			16				106	2.2	22.8	10.9	8.2	
-140-M 42					140	42	69		13.4				111		21.4	10.2	5.8	
-165-M 67					165	67			16				136	2.3	22.9	10.5	9.5	
-M 97						97	39		19.2	32			135		25.3	11.5	11.1	
-170-M 42	2				170	42	33	66	13.4	25	39		141	2.6	21.7	8.8	5.6	
-195-M 67					195	67			16				166		23.2	9.4	9.1	
-M 97	1					97	69	—	19.2	32	—			2.4	25.4	11.1	11.9	
-225-M 97	2				225		30	69			46		196	2.9	25.7	9.3	11.7	
-SLSB6-110-M 42	1	6	10	2	110	42	39	—	14.4	25	—	18	81	2.1	22.2	11.1	3.8	○
-135-M 67					135	67			17	26			105	2.3	24.3		6.5	
-140-M 42					140	42	69		14.4	25			111	2.2	22.3	10.6	4.7	
-165-M 67					165	67			17				136	2.3	24.4	11.1	7.7	
-M 97						97	39		20.2	32					27.3	12.5	8.6	
-170-M 42	2				170	42	33	66	14.4	26	40		140	2.6	22.6	9.1	4.6	
-195-M 67					195	67			17	25	39		166		24.7	10	7.4	
-M 97	1					97	69	—	20.2	36	—		165		27.4	11.1	9.5	
-M127						127	39		23.3	32			166	2.4	29.8	13	11.3	
-225-M 97	2				225	97	28	71	20.2		50		195	3.2	27.8	9.1	9.3	
-M127	1					127	69	—	23.3		—		196	2.5	29.9	12.5	12.4	
-M157						157	39		26.5						32.3	13.6	13.6	
-255-M127	2				255	127	30	69	23.3		46		226	3	30.3	10.6	12.1	▲
-M157	1					157	69	—	26.5		—			2.6	32.4	13.1	15.1	
-285-M157	2				285		30	69			46		256	3.1	32.8	11.1	14.6	
-SLRB6- 90-M 22	1	6	14	4	90	22	39	—	16.3	32	—	18	61	2.2	21.1	10.1	1	○
-110-M 42					110	42			18.4				81	2.3	22.8	10.4	1.6	
-120-M 22					120	22	69		16.3				91	2.4	21.3	9.3	1.2	
-135-M 67					135	67	39		21				106	2.3	24.9	11.4	2.7	
-140-M 42					140	42	69		18.4				111	2.4	22.9	10	2	
-150-M 22	2				150	22	30	69	16.3		46		121	2.8	21.6	8.1	1.2	
-165-M 67	1				165	67	69	—	21		—		136	2.5	25	10.5	3.2	
-170-M 42	2				170	42	30	69	18.4		46		141	2.9	23.3	8.4	1.9	
-195-M 67					195	67	28	71	21		50		168	3.2	25.3	9.2	2.9	
-SLFB6- 90-M 22	1	6	14	4	90	22	39	—	16.3	32	—	18	61	2.2	21.1	10.1	1	○
 -110-M 42					110	42			18.4				81	2.3	22.8	10.4	1.6	
-120-M 22					120	22	69		16.3				91	2.4	21.3	9.3	1.2	
-135-M 67					135	67	39		21	36			105		24.9	10.9	2.6	
-140-M 42					140	42	69		18.4	32			111		22.9	10	2	
-150-M 22	2				150	22	30	69	16.3		46		121	2.8	21.6	8.1	1.2	
-165-M 67	1				165	67	69	—	21		—		136	2.5	25	10.5	3.2	
-170-M 42	2				170	42	30	69	18.4		46		141	2.9	23.3	8.4	1.9	
-195-M 67					195	67			21				166		25.3	9.2	3.1	
A100-SLSA6-165 CV	3	6	9	1.5	165	136	—	—	85	—	—	18	136	3.3	28.8	9.2	2.1	○
-195 CV					195	166							166	4	32	8.4	2.3	
-225 CV					225	196							196	4.1	32.4	8.3	3.6	
-255 CV					255	226							226	4.8	35.9	7.9	3.9	
-285 CV					285	256							256	5	37.4		5.2	▲
-315 CV					315	286							286	5.3	38.9	7.7	6.8	
-345 CV					345	316							316	5.6	40.3	7.6	8.7	







CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lbs	N	G grade	S	
A100-SLSA1/4-165 CV	3	1/4	.37	.06	6.50	5.35	—	—	3.35	—	—	.71	5.35	8.0	27.1	7.8	1.5	○
-195 CV					7.68	6.54							6.54	8.2	27.8	7.9	2.5	
-225 CV					8.86	7.72							7.72	8.4	28.5		3.9	
-255 CV					10.04	8.90							8.90	9.8	32.7	7.7	4.2	
-285 CV					11.22	10.08							10.08	10.4	34.3	7.6	5.6	▲
-315 CV					12.40	11.26							11.26	11.0	36.1		7.4	
-345 CV					13.58	12.44							12.44	11.6	37.5	7.5	9.5	
A100-SLSA8-110-M 42	1	8	11	1.5	110	42	39	—	15.4	36	—	24	80	2.3	23.2	10.6	3.2	○
-135-M 67					135	67			18	32			106		25.8	11.8	5.5	
-140-M 42					140	42	69		15.4	36			110	2.5	23.4	9.8	3.5	
-165-M 67					165	67			18				135		26	10.9	5.8	
-M 97						97	39		21.2	32			136	2.3	29	13.2	8.1	
-170-M 42	2				170	42	28	71	15.4	36	50		140	3.1	23.7	8	3.4	
-195-M 67					195	67	30	69	18	32	46		166	2.9	26.3	9.5	5.9	
-M 97	1					97	69	—	21.2		—			2.5	29.1	12.2	8.9	
-225-M 97	2				225		28	71			36	50	195	3.2	29.5	9.7	8.3	
-SLSB8-110-M 42	1	8	13	2.5	110	42	39	—	17.4	32	—	24	81	2.2	24.3	11.6	2.1	○
-135-M 67					135	67			20				106	2.3	27.5	12.5	3.6	
-140-M 42					140	42	69		17.4				111	2.4	24.5	10.7	2.6	
-165-M 67					165	67			20				136		27.7	12.1	4.2	
-M 97						97	39		23.2						31.4	13.7	5.4	
-170-M 42	2				170	42	28	71	17.4	36	50		140	3.1	24.8	8.4	2.4	
-195-M 67					195	67	30	69	20	32	46		166	2.9	28	10.1	4	
-M 97	1					97	69	—	23.2		—			2.5	31.5	13.2	6.3	
-M127						127	39		26.3					2.4	35.3	15.4	7.3	
-225-M 97	2				225	97	30	69	23.2		46		196	3	31.9	11.2	6	
-M127	1					127	69	—	26.3		—			2.6	35.4	14.3	8.5	
-M157						157	39		29.5	42					39.1	15.2	8.1	
-255-M127	2				255	127	30	69	26.3	32	46		226	3.1	35.7	12.1	8.2	▲
-M157	1					157	69	—	29.5	42	—			2.9	39.3	14.2	8.7	
-285-M157	2				285		28	71			56		256	3.6	39.6	11.5	8.6	
-SLRB8- 90-M 22	1	8	18	5	90	22	39	—	20.3	32	—	24	61	2.2	21.8	10.4	0.7	—
-110-M 42					110	42			22.4				81	2.3	24.4	11.1	1.1	○
-120-M 22					120	22	69		20.3				91	2.4	22	9.6	1	—
-135-M 67					135	67	39		25				106		27.6	12.1	1.8	○
-140-M 42					140	42	69		22.4				111		24.5	10.7	1.6	○
-150-M 22	2				150	22	30	69	20.3		46		121	2.9	22.3	8.1	1	—
-165-M 67	1				165	67	69	—	25		—		136	2.5	27.8	11.7	2.4	○
-170-M 42	2				170	42	28	71	22.4	36	50		140	3.1	24.9	8.4	1.3	○
-195-M 67					195	67	30	69	25	32	46		166	3	28.1	9.8	2.2	○
-SLFB8- 90-M 22	1	8	18	5	90	22	39	—	20.3	36	—	24	60	2.3	21.8	9.9	0.7	—
-110-M 42					110	42			22.4				80		24.4	11.1	1.1	○
-120-M 22					120	22	69		20.3	32			91	2.4	22	9.6	1	—
-135-M 67					135	67	39		25	36			105		27.6	12.1	1.7	○
-140-M 42					140	42	69		22.4				110	2.6	24.5	9.9	1.3	○
-150-M 22	2				150	22	30	69	20.3	32	46		121	2.9	22.3	8.1	1	—
-165-M 67	1				165	67	69	—	25		—		136	2.5	27.8	11.7	2.4	○
-170-M 42	2				170	42	28	71	22.4	36	50		140	3.1	24.9	8.4	1.3	○
-195-M 67					195	67	30	69	25	32	46		166	3	28.1	9.8	2.2	○
A100-SLSA8-165 CV	3	8	11	1.5	165	136	—	—	85	—	—	24	136	3.7	30.7	8.7	1.4	○
-195 CV					195	166							166		31	8.8	2.3	
-225 CV					225	196							196	4.6	35.3	8.1		
-255 CV					255	226							226		35.9	8.2	3.6	▲
-285 CV					285	256							256	4.9	37.4	8	4.8	
-315 CV					315	286							286	5.7	41.9	7.7	5	
-345 CV					345	316							311	6.1	45.1	7.8	6	
-SLRA8-195 CV	3	8	16	4	195	166	—	—	85	—	—	24	166	3.7	28.5	8.1	1.4	○
-225 CV					225	196							196	4.4	32.3	7.7	1.6	
-255 CV					255	226							226	4.6	33.6		2.2	▲
-285 CV					285	256							256	4.8	34.8	7.6	3	

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lb _s	N	G grade	S					
A100-SLFA8-195 CV	3	8	16	4	195	166	—	—	85	—	—	24	166	3.7	28.5	8.1	1.4	○				
 -225 CV					225	196										196	4.4	32.3	7.7	1.6		
-255 CV					255	226										226	4.6	33.6		2.2	▲	
-285 CV					285	256										256	4.8	34.8	7.6	3		
A100-SLSA5/16-165 CV	3	5/16	.43	.06	6.50	5.35	—	—	3.35	—	—	.94	5.35	7.8	26.6	7.9	1.5	○				
-195 CV					7.68	6.54										6.54	7.9	27.2	8	2.4		
-225 CV					8.86	7.72										7.72	9.6	31.2	7.5	2.5		
-255 CV					10.04	8.90										8.90		32.4	7.8	3.9	▲	
-285 CV					11.22	10.08										10.08	10.2	34.2		5.3		
-315 CV					12.40	11.26										11.26	11.9	38.4	7.5	5.4		
-345 CV					13.58	12.44										12.44	12.3	43.5	8.2	6.6		
-SLRA5/16-195 CV	3	5/16	.63	.16	7.68	6.54	—	—	3.35	—	—	.94	6.54	8.3	28	7.8	1.4	○				
-225 CV					8.86	7.72										7.72	9.7	32.2	7.7	1.6		
-255 CV					10.04	8.90										8.90	10.1	33.5		2.3	▲	
-285 CV					11.22	10.08										10.08	10.6	35.1		3.1		
-SLFA5/16-195 CV	3	5/16	.63	.16	7.68	6.54	—	—	3.35	—	—	.94	6.54	8.3	28	7.8	1.4	○				
 -225 CV					8.86	7.72										7.72	9.7	32.2	7.7	1.6		
-255 CV					10.04	8.90										8.90	10.1	33.5		2.3	▲	
-285 CV					11.22	10.08										10.08	10.6	35.1		3.1		
A100-SLSA10-110-M 42	1	10	13	1.5	110	42	39	—	17.4	25	—	30	81	2.2	24.6	23.4	2.7	○				
-135-M 67					135	67						20	32			106	2.3	28.5	26	4.1		
-140-M 42					140	42	69					17.4	25			111	2.2	24.8	23.6	3.8		
-165-M 67					165	67						20	36			135	2.5	28.6	24	4.4		
-M 97					97	39						23.2	32			136	2.3	33.2	30.2	6.2		
-170-M 42					2	170	42	28	71			17.4	36	50			140	3.1	25.1	17	2.5	
-195-M 67						195	67					20					165		29	19.6	4.4	
-M 97					1	97	69	—	23.2					—			2.6	33.3	26.8	6.6		
-225-M 97					2	225		30	69							196	3	33.7	23.5	6.9	▲	
-SLSB10-110-M 42	1	10	16	3	110	42	39	—	20.4	32	—	30	81	2.3	25.8	23.5	1.2	○				
-135-M 67					135	67						23				106		30.4	27.7	2.5		
-140-M 42					140	42	69					20.4				111	2.4	25.9	22.6	2		
-165-M 67					165	67						23				136	2.5	30.5	25.5	3.2		
-M 97					97	39						26.2					2.4	35.9	31.3	3.8		
-170-M 42					2	170	42	30	69			20.4					141	2.9	26.3	19	1.9	
-195-M 67						195	67					23					166		30.9	22.3	3	
-M 97					1	97	69	—	26.2					—			2.6	36.1	29.1	4.8		
-M127						127	39		29.3	42								42.1	33.9	4.6		
-225-M 97					2	225	97	30	69	26.2	32	46				196	3	36.4	25.4	4.5	▲	
-M127					1		127	69	—	29.3	42	—						2.9	42.5	30.7	5	
-M157							157	39		32.5								2.8	47.7	35.7	5.7	
-255-M127						255	127	99	29.3	50						225	3.5	42.8	25.6	5		
-M157							157	69	32.5	42						226	3	48.1	33.6	6.2		
-285-M157						285		99								255	3.6	48.4	28.2	6.1		
A100-SLRB10- 90-M 22					1	10	22	6	90	22	39	—	24.3	32	—	30	61	2.3	22.2	20.2	0.6	—
-110-M 42	110	42										26.4				81		25.9	23.6	0.9	○	
-120-M 22	120	22	69									24.3				91	2.4	22.3	19.5		—	
-135-M 67	135	67	39									29	42			106	2.5	30.5	25.5	1.1	○	
-140-M 42	140	42	69									26.4	32			111		26	21.8	1.4	○	
-150-M 22	2	150	22	28					71	24.3	36	50				120	3.1	22.7	15.3	0.7	—	
-165-M 67		165	67	69					—	29					—		135	2.7	30.6	23.7	1.6	○
-170-M 42	2	170	42	28					71	26.4		50				140	3.2	26.3	17.2	1	—	
-195-M 67		195	67										29	42	56		166	3.5	31	18.5	1.3	—
-SLFB10- 90-M 22	1	10	22	6	90	22	39	—	24.3	32	—	30	61	2.3	22.2	20.2	0.6	—				
 -110-M 42					110	42						26.4				81		25.9	23.6	0.9	○	
-120-M 22					120	22	69					24.3	32			91	2.4	22.3	19.5	0.9	—	
-135-M 67					135	67	39					29	36			105	2.5	30.5	25.5	1.2	○	
-140-M 42					140	42	69					26.4				110	2.6	26	20.9	1.1	○	
-150-M 22					2	150	22	30	69	24.3	32	46				121	2.9	22.7	16.4	0.9	—	
-165-M 67						165	67	69	—	29	36	—					135	2.7	30.6	23.7	1.6	○
-170-M 42					2	170	42	28	71	26.4		50				140	3.2	26.3	17.2	1	—	
-195-M 67						195	67						29	42	56		166	3.5	31	18.5	1.3	—

CODE	Fig.	φD	φC	t	L	M	L1	L2	φC1	φC2	φC3	H	h	Kg lbs	N	G grade	S	
A100-SLSA10-165 CV	3	10	13	1.5	165	136	—	—	85	—	—	30	136	3.5	29.4	8.8	1.4	○
-195 CV					195	166							166	4.3	33.6	8.2	1.5	○
-225 CV					225	196							196	4.2	33.4	8.4	2.4	○
-255 CV					255	226							226	4.5	34.3	8	3.5	▲
-285 CV					285	256							251	5.1	38.3	7.9	3.6	○
-315 CV					315	286							286		39.9	8.2	4.8	○
-345 CV					345	316							311	5.9	42.7	7.6	5.5	○
-SLRA10-165 CV	3	10	19	4.5	165	136	—	—	85	—	—	30	136	3.5	27.6	8.3	1	○
-195 CV					195	166							166	4	30.1	7.9	1.1	○
-225 CV					225	196							196	4.1	31.1	8	1.6	○
-255 CV					255	226							226	4.9	35.3	7.6	1.7	▲
-285 CV					285	256							256	5	36.2		2.4	○
-SLFA10-165 CV	3	10	19	4.5	165	136	—	—	85	—	—	30	136	3.5	27.6	8.3	1	○
-195 CV					195	166							166	4	30.1	7.9	1.1	○
-225 CV					225	196							196	4.1	31.1	8	1.6	○
-255 CV					255	226							226	4.9	35.3	7.6	1.7	▲
-285 CV					285	256							256	5	36.2		2.4	○
A100-SLSA3/8-165 CV	3	3/8	.49	.06	6.50	5.35	—	—	3.35	—	—	1.18	5.35	7.5	26	8	1.4	○
-195 CV					7.68	6.54							6.54	9.2	30	7.6	1.5	○
-225 CV					8.86	7.72							7.72		30.4	7.7	2.5	○
-255 CV					10.04	8.90							8.90	9.4	32.2	7.9	3.8	▲
-285 CV					11.22	10.08							10.08	10.5	38.4	8.5	4	○
-315 CV					12.40	11.26							11.26	11.6	38.2	7.6	5.2	○
-345 CV					13.58	12.44							12.44	12.2	44	8.4	6.2	○
-SLRA3/8-165 CV	3	3/8	.73	.18	6.50	5.35	—	—	3.35	—	—	1.18	5.35	8.5	28.9	7.9	0.8	○
-195 CV					7.68	6.54							6.54	8.8	30.1		1.1	○
-225 CV					8.86	7.72							7.72	9.2	31.3		1.6	○
-255 CV					10.04	8.90							8.90	10.9	35.5	7.5	1.7	▲
-285 CV					11.22	10.08							10.08	11.3	36.6		2.4	○
-SLFA3/8-165 CV	3	3/8	.73	.18	6.50	5.35	—	—	3.35	—	—	1.18	5.35	8.5	28.9	7.9	0.8	○
-195 CV					7.68	6.54							6.54	8.8	30.1		1.1	○
-225 CV					8.86	7.72							7.72	9.2	31.3		1.6	○
-255 CV					10.04	8.90							8.90	10.9	35.5	7.5	1.7	▲
-285 CV					11.22	10.08							10.08	11.3	36.6		2.4	○
A100-SLSA12-110-M 42	1	12	15	1.5	110	42	39	—	19.4	32	—	30	79	2.2	27	25.7	1.9	○
-135-M 67					135	67			22				104	2.3	32.5	29.6	3.4	○
-140-M 42					140	42	69		19.4				109	2.4	27.2	23.7	2.4	○
-165-M 67					165	67			22				134		32.6	28.4	4.1	○
-M 97					97	39			25.2					2.3	39.4	35.9	5.1	○
-170-M 42	2				170	42	28	71	19.4	36	50		135	3.1	27.5	18.6	2.1	○
-195-M 67					195	67	30	69	22	32	46		164	2.9	32.9	23.8	3.9	○
-M 97	1					97	69	—	25.2	36	—		160	2.7	39.6	30.7	5.5	○
-225-M 97	2				225		30	69		32	46		194	3	39.9	27.9	5.8	▲
-SLSB12-110-M 42	1	12	19	3.5	110	42	39	—	23.4	32	—	30	79	2.3	28.4	25.9	1.2	○
-135-M 67					135	67			26				104		34.7	31.6	2	○
-140-M 42					140	42	69		23.4				109	2.4	28.5	24.9	1.7	○
-165-M 67					165	67			26				134	2.5	34.8	29.2	2.7	○
-M 97					97	39			29.2	50			130	2.7	42.9	33.3	2.4	○
-170-M 42	2				170	42	28	71	23.4	36	50		135	3.1	28.9	19.5	1.4	○
-195-M 67					195	67	30	69	26	32	46		164	3	35.2	24.6	2.5	○
-M 97	1					97	69	—	29.2	50	—		160	3.1	43.2	29.2	2.6	○
-M127					127	39			32.3	42			163	2.7	50.4	39.1	3.3	○
-225-M 97					225	97			29.2	50			190	3.4	43.6	26.9	2.8	▲
-M127					127	69			32.3	42			192	3	50.8	35.5	3.8	○
-M157					157	39			35.5				193	2.9	58	41.9	4.2	○
-255-M127	2				255	127	28	71	32.3		56		222	3.6	51.1	29.7	3.7	○
-M157	1				157	69	—	—	35.5		—			3.1	58.3	39.4	4.8	○
-285-M157	2				285		99			50			252	3.7	58.7	32.4	4.7	○

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lbs	(N)	G grade	S	
A100-SLRB12- 90-M 22	1	12	26	7	90	22	39	—	28.3	42	—	30	58	2.4	26.5	23.1	0.4	—
-110-M 42					110	42			30.4				78	2.5	29.2	24.5	0.6	
-120-M 22					120	22	69		28.3				87	2.6	26.8	21.6	0.5	
-135-M 67					135	67	39		33				103		35.5	28.6	0.9	
-140-M 42					140	42	69		30.4				107	2.7	29.6	23	0.8	
-150-M 22	2				150	22	28	71	28.3				117	3.3	27.2	17.3	0.5	
-165-M 67	1				165	67	69	—	33				132	2.9	35.8	25.9	1.1	
-170-M 42					170	42	99		30.4	50			135	3.3	29.9	19	0.8	
-195-M 67	2				195	67			33	42	56		160	3.4	36.2	21.7	1.1	
-SLFB12- 90-M 22	1	12	26	7	90	22	39	—	28.3	42	—	30	58	2.4	26.5	23.1	0.4	○
 -110-M 42					110	42			30.4				78	2.5	29.2	24.7	0.6	
-120-M 22					120	22	69		28.3				87	2.6	26.8	21.6	0.5	
-135-M 67					135	67	39		33	50			100	2.7	35.5	27.5	0.8	
-140-M 42					140	42	69		30.4				105	3	29.6	20.7	0.6	
-150-M 22	2				150	22	28	71	28.3	42	56		117	3.3	27.2	17.3	0.5	
-165-M 67	1				165	67	69	—	33				132	2.9	35.8	25.9	1.1	
-170-M 42					170	42	99		30.4	50			135	3.3	29.9	19	0.8	
-195-M 67	2				195	67	28	71	33	42	56		162	3.5	36.2	21.7	1.1	
-SLSA12-165 CV	3	12	15	1.5	165	136	—	—	85	—	—	30	133	4.2	34.1	8.5	1.2	○
-195 CV					195	166							163	4.1	33.6	8.6		
-225 CV					225	196							175	4.8	38.3	8.4	1.8	
-255 CV					255	226							190		37.8	8.3	2.6	▲
-285 CV					285	256							251	5.5	42.5	8.1	3.5	
-315 CV					315	286							281	5.9	44.6	7.9	4.3	
-345 CV					345	316							311	6.2	46.7		5.3	
-SLRA12-165 CV	3	12	22	5	165	136	—	—	85	—	—	30	133	3.6	27.9	8.1	0.8	—
-195 CV					195	166							163	4.4	32.2	7.7		
-225 CV					225	196							159		32.7	7.8	1.3	○
-255 CV					255	226							221	4.6	36.1	8.2	1.6	▲
-285 CV					285	256							251	5	38.5	8.1	2.1	
-SLFA12-165 CV	3	12	22	5	165	136	—	—	85	—	—	30	133	3.6	27.9	8.1	0.8	—
 -195 CV					195	166							163	4.4	32.2	7.7		
-225 CV					225	196							159		32.7	7.8	1.3	○
-255 CV					255	226							221	4.6	36.1	8.2	1.6	▲
-285 CV					285	256							251	5	38.5	8.1	2.1	
A100-SLSA1/2-165 CV	3	1/2	.62	1.5	6.50	5.35	—	—	3.35	—	—	1.18	5.28	7.5	26.8	8.3	1.2	○
-195 CV					7.68	6.54							6.46	9.2	31.2	7.9	1.3	
-225 CV					8.86	7.72							6.89	9.6	32.7		1.9	
-255 CV					10.04	8.90							7.48	10.1	34.2	7.8	2.8	▲
-285 CV					11.22	10.08							9.92	10.2	39.6	9.0	3.8	
-315 CV					12.40	11.26							11.10	11.0	42.4	8.9	4.7	
-345 CV					13.58	12.44							12.28	11.8	45.9	9.0	5.9	
-SLRA1/2-165 CV	3	1/2	.89	.20	6.50	5.35	—	—	3.35	—	—	1.18	5.20	8.8	31.7	8.3	0.6	—
-195 CV					7.68	6.54							5.71	9.4	31.5	7.8	0.9	
-225 CV					8.86	7.72								11.2	35.8	7.4	1.0	○
-255 CV					10.04	8.90							8.74	12.1	42.1	8.1	1.1	▲
-285 CV					11.22	10.08							9.92	10.8	41.0	8.8	2.2	
-SLFA1/2-165 CV	3	1/2	.89	.20	6.50	5.35	—	—	3.35	—	—	1.18	5.20	8.8	31.7	8.3	0.6	—
 -195 CV					7.68	6.54							5.71	9.4	31.5	7.8	0.9	
-225 CV					8.86	7.72								11.2	35.8	7.4	1.0	○
-255 CV					10.04	8.90							8.74	12.1	42.1	8.1	1.1	▲
-285 CV					11.22	10.08							9.92	10.8	41.0	8.8	2.2	

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h	Kg lbs	N	G grade	S
A100-SLSB16-110-M 42	1	16	24	4	110	42	39	—	28.4	42	—	32	78	2.4	34.7	30.3	0.7
-135-M 67					135	67	—	31	—	—	103	2.5	45	37.7	1.2		
-140-M 42					140	42	69	28.4	—	—	107	2.7	35	27.1	0.9		
-165-M 67					165	67	—	31	—	—	132	2.8	45.4	34	1.4		
-M 97					—	97	39	34.2	—	—	133	2.7	57.4	44.5	1.7		
-170-M 42					170	42	99	28.4	50	—	135	3.2	35.4	23.2	0.9		
-195-M 67					195	67	—	31	—	—	160	3.3	45.7	29	1.4		
-M 97					—	97	69	34.2	42	—	162	2.9	57.8	41.7	2.1		
-M127					—	127	39	37.3	50	—	160	3	69.8	48.7	2.2		
-225-M 97					225	97	99	34.2	—	—	190	3.5	58.1	34.8	2.1		
-M127					—	127	69	37.3	53	—	—	3.4	70.2	43.2	2.3		
-M157					—	157	39	40.5	—	—	193	3.3	82.3	52.2	2.6		
-255-M127					2	255	127	28	71	37.3	—	67	220	4.3	70.6	34.4	2.3
-M157					1	—	157	69	—	40.5	—	—	—	3.7	82.6	46.8	2.9
-285-M157					2	285	—	28	71	—	—	67	250	4.6	83	37.8	—
-SLRB16- 90-M 22	1	16	32	8	90	22	39	—	34.3	42	—	32	58	2.4	26.5	23.1	0.4
-110-M 42					110	42	—	36.4	—	—	78	2.5	34.8	29.2	0.5		
-120-M 22					120	22	69	34.3	—	—	87	2.7	26.9	20.9	—		
-135-M 67					135	67	39	39	—	—	103	—	45.2	35.1	0.7		
-140-M 42					140	42	69	36.4	—	—	107	2.8	35.2	26.3	—		
-150-M 22					150	22	99	34.3	50	—	115	3.2	27.2	17.8	0.5		
-165-M 67					165	67	69	39	42	—	132	3	45.5	31.8	1		
-170-M 42					2	170	42	28	71	36.4	—	56	137	3.5	35.5	21.2	0.7
-195-M 67					1	195	67	—	—	39	—	—	162	3.6	45.9	26.7	0.9
-SLFB16- 90-M 22					1	16	32	8	90	22	39	—	34.3	42	—	32	58
 -110-M 42	110	42	—	36.4					—	—	78	2.5	34.8	29.2	0.5		
-120-M 22	120	22	69	34.3					—	—	87	2.7	26.9	20.9	—		
-135-M 67	135	67	39	39					—	—	103	—	45.2	35.1	0.7		
-140-M 42	140	42	69	36.4					—	—	107	2.8	35.2	26.3	—		
-150-M 22	2	150	22	28					71	34.3	—	56	117	3.4	27.2	16.8	0.5
-165-M 67	1	165	67	69					—	39	—	—	132	3	45.5	31.8	1
-170-M 42	1	170	42	99					—	36.4	50	—	135	3.4	35.5	21.9	0.7
-195-M 67	2	195	67	—					—	39	—	—	162	3.6	45.9	26.7	0.9
A100-SLSB16-165 CV	3	16	21	2.5					165	136	—	—	85	—	—	32	131
-195 CV					195	166	—	—	—	—	161	4	33.7	8.8	1.1		
-225 CV					225	196	—	—	—	—	191	4.8	38.4	8.4	1.2		
-255 CV					255	226	—	—	—	—	221	4.7	38	8.5	2		
-285 CV					285	256	—	—	—	—	251	5.5	42.6	8.1	—		
-315 CV					315	286	—	—	—	—	281	5.9	44.8	8	2.6		
-345 CV					345	316	—	—	—	—	311	6.2	46.9	7.9	3.3		
A100-SLSB5/8-165 CV					3	5/8	.82	.10	6.50	5.35	—	—	3.35	—	—	1.26	5.20
-195 CV	7.68	6.54	—	—					—	—	6.38	8.6	32.6	8.8	1.2		
-225 CV	8.86	7.72	—	—					—	—	7.56	10.4	37.6	8.4	—		
-255 CV	10.04	8.90	—	—					—	—	8.74	10.1	38.3	8.8	2.0		
-285 CV	11.22	10.08	—	—					—	—	9.92	11.9	43.4	8.4	2.2		
-315 CV	12.40	11.26	—	—					—	—	11.10	12.7	46.3	—	2.8		
-345 CV	13.58	12.44	—	—					—	—	12.28	13.5	49.1	—	3.5		

CODE	Fig.	φD	φC	t	L	M	L ₁	L ₂	φC ₁	φC ₂	φC ₃	H	h				
A100-SLSB20-110-M 42	1	20	29	4.5	110	42	39	—	33.4	42	—	40	78	2.5	37.4	31.3	0.6
-135-M 67					135	67			36				103		52.8	42.5	0.9
-140-M 42					140	42	69		33.4				107	2.7	37.8	29.3	0.8
-165-M 67					165	67			36	50			130	3.1	53.2	35.9	1
-M 97						97	39		39.2	53			133	2.9	71.3	51.5	1.1
-170-M 42	2				170	42	28	71	33.4	42	56		137	3.4	38.1	23.5	0.8
-195-M 67					195	67			36				162	3.5	53.5	32	1.2
-M 97	1					97	69	—	39.2	53	—			3.3	71.7	45.5	1.3
-195-M127						127	39		42.3				163	3.2	91	59.6	1.5
-225-M 97	2				225	97	28	71	39.2		67		190	4.3	72	35.1	1.3
-M127	1					127	69	—	42.3	50	—			3.5	91.4	54.7	1.9
-M157						157	39		45.5	53			193		109.6	65.6	
-255-M127					255	127	99		42.3	50			220	3.8	91.8	50.6	2.3
-M157						157	69		45.5	53				3.9	109.9	59	2.2
-285-M157	2				285		28	71			67		250	4.8	110.3	48.1	
-SLRB20-110-M 42	1	20	38	9	110	42	39	—	42.4	53	—	40	78	2.8	37.5	28	0.3
-135-M 67					135	67			45				103	3.1	53	35.8	0.5
-140-M 42					140	42	69		42.4				105	3.2	37.9	24.8	0.4
-165-M 67					165	67			45				130	3.5	53.3	31.9	0.6
-170-M 42					170	42	99		42.4	50			135		38.2	22.9	0.7
-195-M 67	2				195	67	28	71	45	53	67		160	4.4	53.7	25.6	0.6
-SLFB20-110-M 42	1	20	38	9	110	42	39	—	42.4	53	—	40	78	2.8	37.5	28	0.3
 -135-M 67					135	67			45				103	3.1	53	35.8	0.5
-140-M 42					140	42	69		42.4				105	3.2	37.9	24.8	0.4
-165-M 67					165	67			45				130	3.5	53.3	31.9	0.6
-170-M 42	2				170	42	28	71	42.4		67		135	4.1	38.2	19.5	0.4
-195-M 67	1				195	67	99	—	45	50	—		160	3.7	53.7	30.4	0.9
A100-SLSB20-165 CV	3	20	26	3	165	136	—	—	85	—	—	40	132	4	33.6	8.8	0.6
-195 CV					195	166							161	4.9	38.1	8.2	0.7
-225 CV					225	196							191	4.6	37.4	8.5	1.2
-255 CV					255	226							221	5.5	42.1	8	1.3
-285 CV					285	256							251	5.2	41.2	8.3	2.1
-315 CV					315	286							281	6.1	46	7.9	2.3
-345 CV					345	316							311	6.4	47.9		2.9
A100-SLSB3/4-165 CV	3	3/4	.99	.12	6.50	5.35	—	—	3.35	—	—	1.50	5.20	8.6	31.5	8.5	0.6
-195 CV					7.68	6.54							6.38	10.4	36.6	8.1	0.7
-225 CV					8.86	7.72							7.56	10.0	37.5	8.7	1.2
-255 CV					10.04	8.90							8.74	11.7	42.6	8.4	1.3
-285 CV					11.22	10.08							9.92	11.4	43.5	8.8	2.2
-315 CV					12.40	11.26							11.10	13.1	48.6	8.6	2.3
-345 CV					13.58	12.44							12.28	13.8	51.6	8.7	3.0
A100-SLRB25-110-M 42	1	25	45	10	110	42	39	—	49.6	53	—	45	78	2.9	40.7	29.4	0.3
-140-M 42					140		69						105	3.3	41	26	0.4
-170-M 42	2				170		28	71			67		135	4.2	41.4	20.6	
-SLFB25-110-M 42	1	25	45	10	110	42	39	—	49.6	53	—	45	78	2.9	40.7	29.4	0.3
 -140-M 42					140		69			50			105	3.2	41	26.8	0.5
-170-M 42	2				170		28	71		53	67		135	4.2	41.4	20.6	0.4

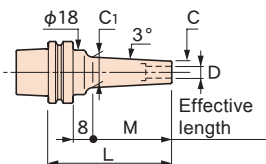
E25

E25-SLSA3-50

MONO 3°

Rigidity value (μm/kgf) P.118

Imbalance value (g·mm) N
G grade (20000 min⁻¹) P.121



Caution

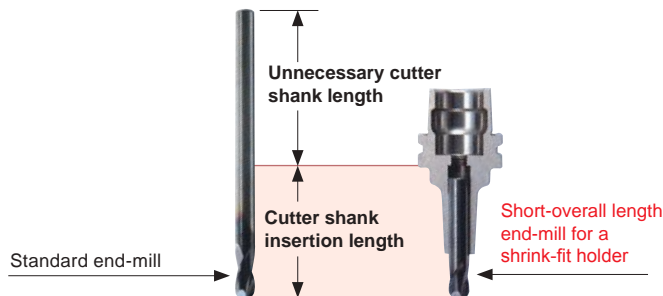
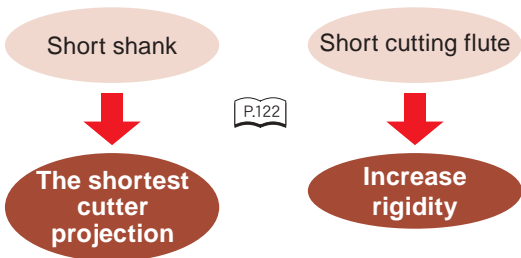
- The coolant duct is not sold with a holder. Consult us if you need it.
- Setting cutters - Be sure to insert the tool beyond the safety mark.

CODE	φD	φC	t	L	M	L ₁	φC ₁	H	h	Kg	N	G grade	S	
E25-SLSA3-35	3	6	1.5	35	17	8	7.8	9	29	0.06	0.37	12.9	3.6	
-50				50	32		9.4		44			0.39	13.6	7
-SLRA3-35				7.5	2.25		35		17			9.3	29	0.37
E25-SLSA3.175-35	3.175	6.175	1.5	35	17	8	8	9	29	0.06	0.37	12.9	3.5	
-50				50	32		9.6		44			0.39	13.6	6.6
E25-SLSA4-35	4	7	1.5	35	17	8	8.8	12	29	0.06	0.38	13.3	2.8	
-50				50	32		10.4		44			0.4	14	5.3
-SLRA4-35				10	3		35		17			11.8	29	0.38
E25-SLSA5-35	5	8	1.5	35	17	8	9.8	15	26	0.06	0.38	13.3	2.2	
E25-SLSA6-35	6	9	1.5	35	17	8	10.8	18	26	0.05	0.38	15.9	1.8	
-50				50	32		12.4		39			0.07	0.43	12.9
-SLRA6-35				12	3		35		17	13.8	26	0.39	11.7	1.1

A short carbide end-mill for the shrink-fit holder

The shrink-fit holder doesn't need standard length cutting tools, because it has shorter insertion length.

A short end-mill for the shrink-fit holder



Centering bar
To identify workpiece datum position

CODE
ST6-CEB102

Cleaning tool
Use when cleaning the machine spindle taper. Replaceable leather strip.

CODE
SCT-E25

■ Std. Access. ● Spare leather set

Measuring instrument tool holder
Use when centering a workpiece. The spring collet (C10-6-P) and the centering bar (ST6-CEB102) are required and sold separately. Fasten nuts by hand.

CODE
E25-CEH10-37

■ Caution ● Not usable for machining.

Holder stand

P.12

⚠ Be aware of max. insertion length (h)!
If you insert cutter beyond the max. insertion length (h), the machine spindle might not be able to clamp the holder properly and thus damage the spindle. Please use our exclusive adapter to recognize the max. insertion length when you shrink-fit.

SODICK UH430L/UH650L
TT1-400A/OPM250L

MITSUI SEIKI VL30

ROKU-ROKU MEGA-SS Series
Android

E32

E32-SLRA4-50-M22

MONO 3°



Fig. 1

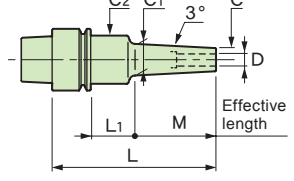
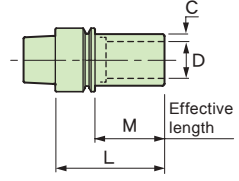


Fig. 2



E32-SLSA4-90 cv

MONO CURVE

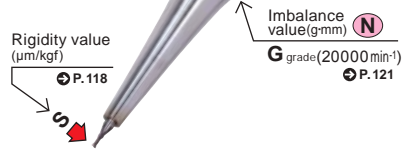
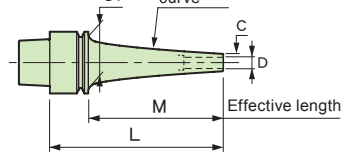


Fig. 3



Caution

- The coolant duct is not sold with a holder. Consult us if you need it.
- Setting cutters ··· Be sure to insert the tool beyond the safety mark.

CV: Curve

Thickness

20000 min⁻¹

CODE	Fig.	φD	φC	t	L	M	L1	φC1	φC2	H	h	Kg lbs	N	G grade	S
E32-SLSA3-50-M22	1	3	6	1.5	50	22	8	8.3	20	9	42	0.1	0.4	8.4	4.7
-70-M42					70	42		10.4			62	0.2		4.2	9.5
-85-M42					85	23	25	77	0.8		8.4	9.4			
-SLRA3-50-M22	1	3	7.5	2.25	50	22	8	9.8	20	9	42	0.1	0.4	8.4	2.8
-70-M42					70	42		11.9			62	0.2		4.2	5.3
-85-M42					85	23	25	77	0.8		8.4	5.5			
E32-SLSA3.175-50-M22	1	3,175	6,175	1.5	50	22	8	8.5	20	9	42	0.1	0.4	8.4	4.4
E32-SLSA4-50-M22	1	4	7	1.5	50	22	8	9.3	20	12	42	0.1	0.4	8.4	3.6
-70-M42					70	42		11.4			62	0.2		4.2	7.3
-85-M42					85	23	25	77	0.8		8.4	7.4			
-SLRA4-50-M22	1	4	10	3	50	22	8	12.3	20	12	42	0.2	0.4	4.2	1.7
-70-M42					70	42		14.4			62	0.5		5.2	3.1
-85-M42					85	23	25	77	0.9		9.4	3.2			
-SLSA4-60 cv	3	4	7	1.5	60	40	—	26	—	12	43	0.2	0.6	6.3	2.4
-90 cv					90	70					73	0.8		8.4	6.1
E32-SLRA3/16-60 cv	3	3/16	.31	.06	2.37	1.58	—	1.02	—	.59	1.69	0.4	0.6	7.3	2.4
-90 cv					3.55	2.76					2.87	0.5		0.8	8.2
E32-SLSA6-70-M42	1	6	9	1.5	70	42	8	13.4	20	18	62	0.2	0.5	5.2	4.8
-SLRA6-50-M22	1	6	12	3	50	22	8	14.3	26	18	39	0.2	0.5	5.2	1.2
-70-M42					70	42		16.4			62	2.4			
-85-M42					85	23	25	77	0.9		9.4	2.5			
-SLRA6-60 cv	3	6	9	1.5	60	40	—	26	—	18	43	0.2	0.7	7.3	1.9
-90 cv					90	70					73	0.9		9.4	4.9
E32-SLRA1/4-60 cv	3	1/4	.37	.06	2.37	1.58	—	1.02	—	.71	1.69	0.4	0.7	8.5	1.9
-90 cv					3.55	2.76					2.87	0.5		0.9	9.2
E32-SLRA8-50-M22	1	8	14	3	50	22	8	16.3	26	24	39	0.2	0.5	5.2	1
-85-M42					85	42		23			18.4	25		69	0.9
-SLSA8-60 cv	3	8	11	1.5	60	40	—	26	—	24	38	0.2	0.7	7.3	1.6
-90 cv					90	70					1	10.5		4	

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h			G grade	
E32-SLSA5/16-60 CV	3	5/16	.43	.06	2.37	1.58	—	1.02	—	.94	1.89	0.4	0.7	8.5	1.6
-90 CV					3.55	2.76					2.36				
E32-SLRA10-55-M22	1	10	16	3	55	22	13	18.3	26	25	44	0.2	0.6	6.3	0.9
-SLSA10-60 CV	3	10	13	1.5	60	40	—	26	—	30	48	0.2	0.8	8.4	1.4
-90 CV					90	70					60				
E32-SLSA3/8-60 CV	3	3/8	.49	.06	2.37	1.58	—	1.02	—	1.18	1.89	0.4	0.8	9.7	1.4
-90 CV					3.55	2.76					2.36				
E32-SLRA12-55-M22	1	12	20	4	55	22	13	22.3	26	30	44	0.2	0.7	7.3	0.7
E32-SLRA16-55-M35	2	16	26	5	55	35	—	—	—	32	44	0.2	0.6	6.3	0.7

Cleaning tool
Use when cleaning the machine spindle taper. A leather is an exchange formula. (1 set of leather for exchange is attached.)

φ40
φ30
120
Leather

CODE
SCT-E32

Be aware of max. insertion length (h)!
If you insert cutter beyond the max. insertion length (h), the machine spindle might not be able to clamp the holder properly and thus damage the spindle. Please use our exclusive adapter to recognize the max. insertion length when you shrink-fit.

Max. insertion length

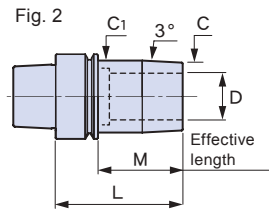
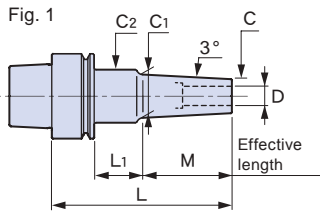
Ex. ADH-HSK32

SUGINO	Xion-III, Xion-II -5AX	
SODICK	UH430L, UH650L	
DMG MORI	HSC 20 linear	
MAKINO	V22, V33i, iQ300	
MITSUI SEIKI	VL30	
MITSUBISHI	μV1	
YASDA	YMC430	

E40

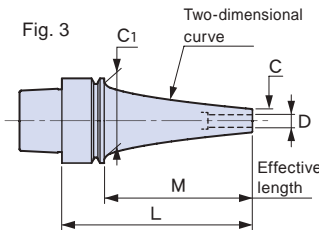
E40-SLRA10-55-M22

MONO 3°



E40-SLRA6-90 cv

MONO CURVE



Caution





- The coolant duct is not sold with a holder. Consult us if you need it.
- Setting cutters - Be sure to insert the tool beyond the safety mark.

CV: Curve

Thickness


20000 min⁻¹

CODE	Fig.	φD	φC	t	L	M	L1	φC1	φC2	H	h	Kg lbs	N	G grade	S			
E40-SLSA3- 50-M22	1	3	6	1.5	50	22	8	8.3	20	9	42	0.2	0.7	7.3	4.6			
- 70-M42					70	42		10.4	62		9.4							
- 85-M42					85		23		25		69				0.3	1.1	7.7	9.3
-110-M67					110	67		13			94					2.2	15.4	15
-SLRA3- 50-M22	1	3	7.5	2.25	50	22	8	9.8	20	9	42	0.2	0.7	7.3	2.8			
- 70-M42					70	42		11.9	62		5.3							
- 85-M42					85		23		25		69				0.3	1.1	7.7	5.4
-110-M67					110	67		14.5			94							9
E40-SLSA3.175-50-M22	1	3.175	6.175	1.5	50	22	8	8.5	20	9	42	0.2	0.7	7.3	4.4			
E40-SLSA4- 50-M22	1	4	7	1.5	50	22	8	9.3	20	12	42	0.2	0.7	7.3	3.6			
- 70-M42					70	42		11.4	62		7.2							
- 85-M42					85		23		25		74				0.3	1.1	7.7	7.3
-110-M67					110	67		14			99					1.2	8.4	11.9
-SLRA4- 50-M22	1	4	10	3	50	22	8	12.3	20	12	42	0.2	0.7	7.3	1.6			
- 70-M42					70	42		14.4	62		0.3					4.9	3	
- 85-M42					85		23		25		69					1.1	7.7	3.1
-110-M67					110	67		17			94					1.2	8.4	5.2
-SLSA4- 90 cv	3	4	7	1.5	90	70	—	34	—	12	74	0.3	1.5	10.5	2.9			
-120 cv					120	100			104		0.4				1.8	9.4	6.5	
-150 cv					150	130			134		0.5				2.4	10.1	8.6	
-SLRA4- 90 cv	3	4	10	3	90	70	—	34	—	12	74	0.4	1.6	8.4	2			
-120 cv					120	100			104						1.9	9.9	4.2	
E40-SLSA3/16- 90 cv	3	3/16	.31	.06	3.55	2.76	—	1.34	—	0.59	2.91	0.8	1.7	10.2	2.9			
-120 cv					4.73	3.94			4.09						1.9	10.4	6.5	
-150 cv					5.91	5.12			5.28		1.1				2.6	11.3	8.6	
-SLRA3/16- 90 cv	3	3/16	.42	.12	3.55	2.76	—	1.34	—	0.59	2.91	0.8	1.7	9.8	2			
-120 cv					4.73	3.94			4.09		0.9				2	10.3	4.2	
E40-SLSA6- 50-M22	1	6	9	1.5	50	22	8	11.3	20	18	39	0.2	0.7	7.3	2.2			
- 70-M42					70	42		13.4	54		4.7							
- 85-M42					85		23		25		69				0.3	1.1	7.7	4.9
-110-M67					110	67		16			94					1.2	8.4	8

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h				
E40-SLRA6- 50-M22	1	6	12	3	50	22	8	14.3	26	18	39	0.2	0.7	7.3	1.2
- 70-M42					70	42		16.4			54	0.3	0.8	5.6	2.3
- 85-M42					85	67	23	25	69		1.2	8.4	2.5		
-110-M67					110		19	94	0.4			6.3	4.1		
-SLSA6- 90 CV	3	6	9	1.5	90	70	—	34	—	18	74	0.3	1.6	11.2	2.5
-120 CV					120	100					104	0.4	1.9	9.9	5.6
-150 CV					150	130					134	0.5	2.5	10.5	7.7
-SLRA6- 90 CV	3	6	13	3.5	90	70	—	34	—	18	74	0.4	1.7	8.9	1.7
-120 CV					120	100					104	0.5	2.4	10.1	2.6
E40-SLSA1/4- 90 CV	3	1/4	.37	.06	3.55	2.76	—	1.34	—	0.71	2.91	0.8	1.7	10.1	2.5
-120 CV					4.73	3.94					4.09	0.9	2	10.8	5.6
-150 CV					5.91	5.12					5.28	1.1	2.6	11.2	7.7
-SLRA1/4- 90 CV	3	1/4	.53	.14	3.55	2.76	—	1.34	—	0.71	2.91	0.8	1.8	10.2	1.7
-120 CV					4.73	3.94					4.09	1.0	2.5	11.1	2.6
E40-SLSA8- 60-M22	1	8	11	1.5	60	22	18	13.3	26	24	49	0.3	1	7	1.5
- 80-M42					80	42		15.4			64			7	3.3
-100-M42					100	38	25	84	1.5		10.5	3.8			
-SLRA8- 50-M22	1	8	14	3	50		22	8	16.3	26	20	39	0.2	0.7	7.3
- 85-M42					85	42	23	18.4	25	24	69	0.3	1.2	8.4	2.1
-100-M42					100	38	84	0.4	1.5	7.9	2.4				
-SLSA8- 90 CV	3	8	11	1.5	90	70	—	34	—	24	74	0.3	1.7	11.9	2.2
-120 CV					120	100					104	0.4	2	3.4	
-150 CV					150	130					134	0.5	3	12.6	5.1
-SLRA8- 90 CV	3	8	16	4	90	70	—	34	—	24	74	0.4	1.8	9.4	1.6
-120 CV					120	100					104	0.5	2.5	10.5	2.4
E40-SLSA5/16- 90 CV	3	5/16	.43	.06	3.55	2.76	—	1.34	—	0.94	2.91	0.8	1.7	10.1	2.2
-120 CV					4.73	3.94					4.09	0.9	2.1	11.3	3.4
-150 CV					5.91	5.12					5.28	1.1	2.8	12.1	5.1
-SLRA5/16- 90 CV	3	5/16	.63	.16	3.55	2.76	—	1.34	—	0.94	2.91	0.9	2.2	10.8	1.6
-120 CV					4.73	3.94					4.09	1.1	2.6	11.4	2.4
E40-SLSA10- 60-M22	1	10	13	1.5	60	22	18	15.3	26	30	49	0.3	1	7	1.2
- 80-M42					80	42		17.4			64			1.1	7.7
-100-M42					100	38	25	89	1.5		10.5	3.1			
-SLRA10- 55-M22	1	10	16	3	55	22	13	18.3	26	25	44	0.3	0.9	6.3	0.8
- 85-M42					85	42	23	20.4	25	30	64		1.2	8.4	1.7
-100-M42					100	38	84	0.4	1.6	2.2					
-SLSA10- 90 CV	3	10	13	1.5	90	70	—	34	—	30	74	0.3	1.7	11.9	2
-120 CV					120	100					104	0.4	2.4	12.6	3.2
-150 CV					150	130					134	0.5	3.1	13	5
-SLRA10- 90 CV	3	10	19	4.5	90	70	—	34	—	30	74	0.4	2.1	11	1.1
-120 CV					120	100					104	0.5	2.9	12.1	2
E40-SLSA3/8- 90 CV	3	3/8	.49	.06	3.55	2.76	—	1.34	—	1.18	2.91	0.8	1.8	10.7	2
-120 CV					4.73	3.94					4.09	1.0	2.5	11.7	3.2
-150 CV					5.91	5.12					5.28	1.2	3.2	12.4	5
-SLRA3/8- 90 CV	3	3/8	.73	.185	3.55	2.76	—	1.34	—	1.18	2.91	0.9	2.3	11.3	1.1
-120 CV					4.73	3.94					4.09	1.2	3	11.9	2
E40-SLRA12- 55-M22	1	12	20	4	55	22	13	22.3	26	25	44	0.3	1	7	0.6
- 85-M42					85	42	23	24.4	32	30	74	0.4	1.6	8.4	1.1
E40-SLRA16- 55-M22	1	16	26	5	55	22	13	28.3	34	32	44	0.3	1.2	8.4	0.4
E40-SLRA20- 60-M40	2	20	32	6	60	40	—	34	—	38	49	0.4	1.6	8.4	0.4

OKK
DMG MORI
MITSUI SEIKI
ROKU-ROKU

GR400
 HSC 30 linear
 VL30
 CEQA-SS Series



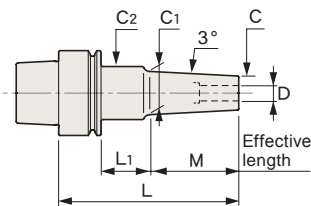
E50

E50-SLSA8-65-M22

MONO 3°



Fig. 1



E50-SLSA6-150 cv

MONO CURVE

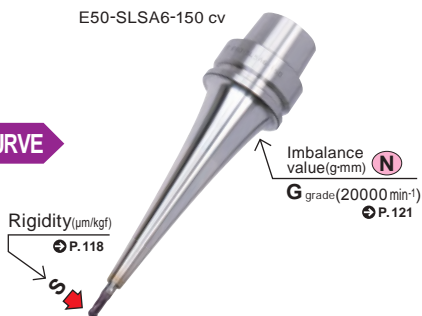
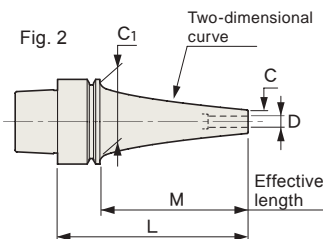


Fig. 2

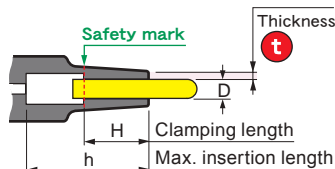


Compatibility table for HRD-01S

[O] Available [-] Not available

Caution

- The coolant duct is not sold with a holder. Consult us if you need it.
- Setting cutters · · · Be sure to insert the tool beyond the safety mark.












CV : Curve

Thickness

20000 min⁻¹

CODE	Fig.	φD	φC	t	L	M	L1	φC1	φC2	H	h	Kg lbs	N	G grade	S	
E50-SLSA3- 60-M22	1	3	6	1.5	60	22	12	8.3	20	9	50	0.4	1.3	6.8	4.7	O
- 75-M22					75		27		25			61		0.5	5.4	4.5
- 80-M42					80	42	12	10.4	20			70				9.3
- 95-M42					95		27		25			81			1.7	7.1
-SLRA3- 75-M22	1	3	7.5	2.25	75	22	27	9.8	25	9	61	0.5	1.7	7.1	2.8	O
- 95-M42					95	42		11.9			81				5.3	
-120-M67					120	67		14.5			106			1.8	7.5	8.9
-150-M97					150	97		17.7			136	0.6			6.3	12.9
E50-SLSA4- 75-M22	1	4	7	1.5	75	22	27	9.3	25	12	61	0.5	1.3	5.4	3.6	O
- 95-M42					95	42		11.4			81			1.8	7.5	7.2
-SLRA4- 75-M22	1	4	10	3	75	22	27	12.3	25	12	61	0.5	1.7	7.1	1.7	O
- 95-M42					95	42		14.4			81			1.8	7.5	3.1
-120-M67					120	67		17			106	0.6			6.3	5.2
-150-M97					150	97		20.2			135	0.7		2.2	6.6	7.8
-SLFB4- 75-M22	1	4	12	4	75	22	27	14.3	25	12	61	0.5	1.9	8	1.4	O
-SLSA4- 90 cv	2	4	7	1.5	90	64	—	42	—	12	74	0.6	2.2	7.7	1.8	-
-120 cv					120	94					104			2.6	9.1	4.2
-150 cv					150	124					134	0.7		3.3	9.9	6
-180 cv					180	154					164	0.8		3.5	9.2	12
-SLRA4-120 cv	2	4	10	3	120	94	—	42	—	12	104	0.7	2.8	8.4	2.7	-
-150 cv					150	124					134	0.8		3.4	8.9	4.1
E50-SLSA3/16- 90 cv	2	3/16	.31	.06	3.55	2.52	—	1.65	—	0.59	2.83	1.4	2.6	8.7	1.7	-
-120 cv					4.73	3.71					4.02	1.4		2.8	9.1	4.2
-150 cv					5.91	4.89					5.20	1.7		3.5	9.6	6
-180 cv					7.09	6.07					6.38	1.7		3.7	9.9	12
-SLRA3/16-120 cv	2	3/16	.42	.12	4.73	3.71	—	1.65	—	0.59	4.02	1.6	3.4	9.5	2.7	-
-150 cv					5.91	4.89					5.20	1.7		3.6	9.8	4.1

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg lbs	N	G grade	S	
E50-SLSA6- 75-M22	1	6	9	1.5	75	22	27	11.3	25	18	61	0.5	1.3	5.4	2.3	○
- 95-M42					95	42		13.4			81		1.6	6.7	4.8	○
-120-M67					120	67		16			106		1.8	7.5	8.1	○
-150-M97					150	97		19.2	32		135	0.6	2.3	8	11	○
-SLSB6- 95-M42	1	6	10	2	95	42	27	14.4	25	18	81	0.5	1.8	7.5	3.7	○
-120-M67					120	67		17			106	0.6		6.3	6.2	○
-150-M97					150	97		20.2	32		135	0.7	2.3	6.9	8.5	○
-SLRA6- 75-M22	1	6	12	3	75	22	27	14.3	25	18	61	0.5	1.5	6.3	1.3	○
- 95-M42					95	42		16.4			81		1.8	7.5	2.5	○
-120-M67					120	67		19			106	0.6	1.9	6.6	4.1	○
-SLRB6- 95-M42	1	6	14	4	95	42	27	18.4	32	18	80	0.6	2.2	7.7	1.6	○
-SLFB6- 75-M22	1	6	14	4	75	22	27	16.3	32	18	60	0.6	2.1	7.3	1	○
-SLSA6- 90 CV	2	6	9	1.5	90	64	—	42	—	18	74	0.6	2.3	8	1.6	—
-120 CV					120	94					104		2.7	9.4	3.5	—
-150 CV					150	124					134	0.7	3.4	10.2	5.4	—
-180 CV					180	154					164	0.9	4.2	9.8	7.6	—
-SLRA6-120 CV	2	6	13	3.5	120	94	—	42	—	18	104	0.8	3.3	8.6	1.8	—
-150 CV					150	124					132	0.9	4	9.3	2.7	—
E50-SLSA1/4- 90 CV	2	1/4	.37	.06	3.55	2.52	—	1.65	—	0.71	2.83	1.4	2.6	8.8	1.6	—
-120 CV					4.73	3.71					4.02	1.4	2.9	9.4	3.5	—
-150 CV					5.91	4.89					5.20	1.7	3.6	9.9	5.4	—
-180 CV					7.09	6.07					6.38	1.9	4.3	10.2	7.6	—
-SLRA1/4-120 CV	2	1/4	.53	.14	4.73	3.71	—	1.65	—	0.71	4.02	1.6	3.4	9.6	1.8	—
-150 CV					5.91	4.89					5.20	2	4.2	10.2	2.7	—
E50-SLSA8- 65-M22	1	8	11	1.5	65	22	17	13.3	26	24	49	0.5	1.5	6.3	1.5	○
- 75-M22					75		27	15.4	25		61		1.6	6.7	1.6	○
- 85-M42					85	42	17		26		67				3.2	○
- 95-M42					95		27		25		81	0.5	2.2	9.2	3.5	○
-120-M67					120	67		18	32		105	0.6	2.3	8	5.4	○
-150-M97					150	97		21.2			132	0.7	2.4	7.2	8.1	○
-SLSB8- 95-M42	1	8	13	2.5	95	42	27	17.4	32	24	80	0.6	2.2	7.7	2.1	○
-120-M67					120	67		20			105	0.6	2.3	8	3.5	○
-150-M97					150	97		23.2			135	0.7	2.4	7.2	5.3	○
-SLRA8- 60-M22	1	8	14	3	60	22	12	16.3	26	24	44	0.5	1.4	5.9	0.9	○
- 75-M22					75		27		25		61		1.5	6.3	1.1	○
- 95-M42					95	42		18.4			81		1.8	7.5	2	○
-SLRB8- 95-M42	1	8	18	5	95	42	27	22.4	32	24	80	0.6	2.2	7.7	1.1	○
-120-M67					120	67		25			105	0.7	2.3	6.9	1.7	○
-SLFB8- 75-M22	1	8	18	5	75	22	27	20.3	32	24	60	0.6	2.2	7.7	0.7	—
-SLSA8- 90 CV	2	8	11	1.5	90	64	—	42	—	24	74	0.6	2.5	8.7	1.4	—
-120 CV					120	94					104	0.7	3.2	9.6	2.2	—
-150 CV					150	124					134		3.5	10.5	4.9	—
-180 CV					180	154					164	0.8	4.2	11	7.1	—
-SLRA8-120 CV	2	8	16	4	120	94	—	42	—	24	102	0.8	3.8	9.9	1.3	—
-150 CV					150	124					132	0.9	4	9.3	2.7	—
E50-SLSA5/16- 90 CV	2	5/16	.43	.06	3.55	2.52	—	1.65	—	0.94	2.83	1.4	2.6	8.7	1.4	—
-120 CV					4.73	3.71					4.02	1.6	3.4	9.7	2.2	—
-150 CV					5.91	4.89					5.20	1.7	3.6	10	4.9	—
-180 CV					7.09	6.07					6.38	1.9	4.4	10.6	7.1	—
-SLRA5/16-120 CV	2	5/16	.63	.16	4.73	3.71	—	1.65	—	0.94	4.02	1.8	4	10.1	1.3	—
-150 CV					5.91	4.89					5.20	1.9	4.2	10.3	2.7	—

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h						
E50-SLSA10- 65-M22	1	10	13	1.5	65	22	17	15.3	26	30	49	0.5	1.5	6.3	1.1	○	
- 75-M22					75		27		25		61			1.6	6.7		1.3
- 85-M42					85	42	17	17.4	26		64			2.2	9.2		2.4
- 95-M42					95		27		25		81			2.3	8		4.1
-120-M67					120	67		20	32		105		0.6	2.5	7.5		6.2
-150-M97					150	97		23.2			64		0.7	2.2	7.7		1.5
-SLSB10- 95-M42	1	10	16	3	95	42	27	20.4	32	30	80	0.6	2.2	7.7	1.5	○	
-120-M67					120	67		23		105	0.7	2.4	7.2	2.4			
-150-M97					150	97		26.2		135		2.5	7.5	3.7			
-SLRA10- 75-M22	1	10	16	3	75	22	27	18.3	25	30	60	0.6	1.5	5.2	1	○	
-SLRB10- 95-M42	1	10	22	6	95	42	27	26.4	32	30	80	0.7	2.3	6.9	0.9	○	
-120-M67					120	67		29	42	107	0.8	3.2	8.4	1.1			
 -SLFB10- 75-M22	1	10	22	6	75	22	27	24.3	32	30	60	0.6	2.2	7.7	0.6	—	
-SLSA10- 90 CV	2	10	13	1.5	90	64	—	42	—	30	74	0.6	2.5	8.7	1.3	—	
-120 CV					120	94				104	0.7	3.3	9.9	2.1			
-150 CV					150	124				134	0.8	4.1	10.7	3.4			
-180 CV					180	154				162		4.3	11.3	6.9			
-SLRA10-150 CV	2	10	19	4.5	150	124	—	42	—	30	132	0.9	4.4	10.2	2.2	—	
E50-SLSA3/8- 90 CV	2	3/8	.49	.06	3.55	2.52	—	1.65	—	1.18	2.83	1.4	2.6	8.8	1.3	—	
-120 CV					4.73	3.71				4.02	1.6	3.4	9.7	2.1			
-150 CV					5.91	4.89				5.20	1.9	4.2	10.4	3.4			
-180 CV					7.09	6.07				6.38	1.9	4.5	11	6.9			
-SLRA3/8-150 CV	2	3/8	.73	.185	5.91	4.89	—	1.65	—	1.18	5.20	2.0	4.7	10.7	2.2	—	
E50-SLSA12- 65-M22	1	12	15	1.5	65	22	17	17.3	26	25	49	0.5	1.6	6.7	0.9	○	
- 75-M22					75		27		25	30	60			1.7	7.1		1.1
- 95-M42					95	42		19.4	32		80			2.2	9.2		1.9
-120-M67					120	67		22		105	0.6		2.4	8.4	3.3		
-SLSB12- 95-M42	1	12	19	3.5	95	42	27	23.4	32	30	80	0.6	2.3	8	1.2	○	
-120-M67					120	67		26		105	0.7	2.5	7.5	1.9			
-150-M97					150	97		29.2		135	0.9	3.5	8.1	2.5			
-SLRA12- 75-M22	1	12	20	4	75	22	27	22.3	25	30	62	0.6	1.6	5.6	0.9	○	
-SLRB12- 95-M42	1	12	26	7	95	42	27	30.4	42	30	82	0.8	3.1	8.1	0.6	—	
-120-M67					120	67		33		107	0.9	3.3	7.7	0.9			
 -SLFB12- 75-M22	1	12	26	7	75	22	27	28.3	42	30	62	0.7	3	9	0.4	—	
E50-SLSB16- 95-M42	1	16	24	4	95	42	27	28.4	42	32	82	0.7	3.2	9.6	0.7	○	
-120-M67					120	67		31		107	0.8	3.5	9.2	1.2			
-SLRA16- 60-M22	1	16	26	5	60	22	12	28.3	34	32	44	0.6	1.7	5.9	0.4	○	
 -SLRB16- 75-M22	1	16	32	8	75	22	27	34.3	42	32	62	0.7	3	9	0.4	○	
 -SLFB16- 75-M22	1	16	32	8	75	22	27	34.3	42	32	62	0.7	3	9	0.4	—	
E50-SLSB20- 95-M42	1	20	29	4.5	95	42	27	33.4	42	40	82	0.7	3.3	9.9	0.6	○	
-SLRA20- 65-M22	1	20	32	6	65	22	17	34.3	40	38	49	0.6	2.2	7.7	0.3	○	

F63

F63-SLSA4-75

MONO 3°

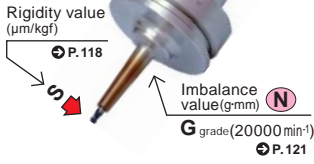
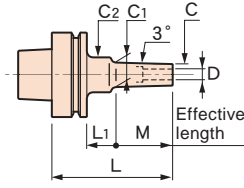


Fig.1

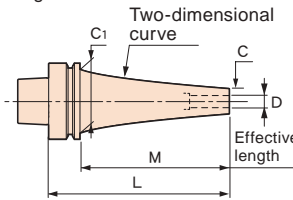


F63-SLRA6-120cv

MONO CURVE



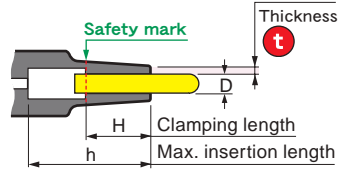
Fig.2



Compatibility table for HRD-01S

[○] Available [—] Not available
 [▲] Usable by raising the heating unit.→P.117
 [★] Use heating coil No. 2.

- Caution**
- The coolant duct is not sold with a holder. Consult us if you need it.
 - Setting cutters... Be sure to insert the tool beyond the safety mark.










cv : Curve

Thickness

20000min⁻¹

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg	N	G grade	S					
F63-SLSA3- 75-M37	1	3	6	1.5	75	37	12	9.9	26	9	58	0.7	1.5	4.5	8					
- 95-M42					95	42	27	10.4	25		78					1.8	5.4	9.1		
-SLRA3- 70-M22	1	3	7.5	2.25	70	22	22	9.8	26	9	53	0.7	1.7	5.1	2.8					
- 75-M22					75		27									25	54	1.8	5.4	
- 95-M42					95	42		11.9			78					1.9	5.7	5.3		
-SLFB3- 75-M22	1	3	9.5	3.25	75	22	27	11.8	25	9	58	0.7	1.9	5.7	1.9					
- 95-M42					95	42					13.9						78	0.8	2	5.2
-120-M67					120	67		16.5			103							5.4		
F63-SLSA4- 95-M42	1	4	7	1.5	95	42	27	11.4	25	12	78	0.7	1.9	5.7	7.2					
-SLRA4- 70-M22					70	22	22				12.3					26	12	53	0.7	1.7
- 75-M22					75		27		25							58		1.8	5.4	
- 95-M42	95	42		14.4		78	0.8	1.9	5	3.1										
-SLFB4- 75-M22	1	4	12	4	75	22	27	14.3	25	12	58	0.7	2	6	1.3					
- 95-M42					95	42	27				16.4						78	0.8	5.2	2.2
-120-M67					120	67	27	19			103						2.1	5.5	3.6	
-SLSA4- 90 cv	2	4	7	1.5	90	64	—	53	—	12	65	0.9	2.7	6.3	1.8					
-120 cv					120	94					95					1	3.6	7.5	2.7	
-150 cv					150	124					125					1.2	4.4	7.7	4	
-180 cv					180	154					154					1.3	5	8.1	6.6	
-210 cv					210	184					185						5.3	8.5	11.6	
-240 cv					240	214					214					1.6	6.5		14	
-270 cv					270	244					245					1.9	8.8	9.7	11.9	
-300 cv					300	274					275					2	9.7	10.2	15.9	
-SLRA4-120 cv					2	4	10				3					120	94	—	53	—
-150 cv	150	124		125				1.1	4.4	8.4		2.9								
-180 cv	180	154		155				1.4	6	9		3.3								
-210 cv	210	184		185				1.5	6.2	8.7		5.6								

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h					
F63-SLSA3/16- 90 CV	2	3/16	.31	.06	3.54	2.52	—	2.09	—	.59	2.56	2	2.8	6.6	2.0	○
-120 CV					4.72	3.70					3.74	2.3	3.6	7.4	2.6	○
-150 CV					5.91	4.88					4.92	2.6	4.5	8.1	4.0	○
-180 CV					7.09	6.06					6.06	2.7	5.2	8.7	6.5	○
-210 CV					8.27	7.24					7.24	3.2	6.4	9.3	8.4	○
-240 CV					9.45	8.43					8.43	3.6	7.6	9.8	10.6	○
-270 CV					10.63	9.61					9.61	4	8.9	10.3	13.2	○
-300 CV					11.81	10.79					10.83	4.5	10	10.2	16.1	○
-SLRA3/16-120 CV	2		.42	.12	4.72	3.70	—	2.09	—	.59	3.70	2.3	3.8	7.7	1.8	○
-150 CV					5.91	4.88					4.88	2.7	5	8.5	2.4	○
-180 CV					7.09	6.06					6.10	2.8	5.3	8.6	4.3	○
-210 CV					8.27	7.24					7.24	2.8	5.8	9.5	5.7	○
F63-SLSA6- 75-M37	1	6	9	1.5	75	37	12	12.9	26	18	58	0.7	1.5	4.5	4	○
- 95-M42					95	42	27	13.4	25		78	0.7	1.9	5.7	4.8	○
-SLSB6- 95-M42	1	6	10	2	95	42	27	14.4	25	18	78	0.7	1.9	5.7	3.7	○
-SLRA6- 75-M22	1	6	12	3	75	22	27	14.3	25	18	58	0.7	1.8	5.4	1.3	○
- 95-M42					95	42		16.4			78	0.8	1.9	5	2.4	○
 -SLFB6- 75-M22	1	6	14	4	75	22	27	16.3	32	18	58	0.8	2.2	5.8	1	○
-SLSA6- 90 CV	2	6	9	1.5	90	64	—	53	—	18	65	0.9	2.8	6.5	1.6	○
-120 CV					120	94					95	1	3.6	7.5	2.3	○
-150 CV					150	124					125	1.2	4.4	7.7	3.6	○
-180 CV					180	154					154	1.3	5.2	8.4	5.7	○
-210 CV					210	184					184	1.5	6.4	8.9	7.3	○
-240 CV					240	214					214	1.6	6.7	8.8	12	○
-270 CV					270	244					245	2	9.7	10.2	8.5	▲
-300 CV					300	274					275	2.2	10.6	10.1	11.7	○
-SLRA6- 90 CV	2	6	13	3.5	90	64	—	53	—	18	65	1	3.4	7.1	0.8	★
-120 CV					120	94					95	1.2	4.3	7.5	1.2	○
-150 CV					150	124					125	1.3	5.2	8.4	1.9	○
-180 CV					180	154					155	1.4	6.1	9.1	2.8	○
-210 CV					210	184					185	1.5	6.6	9.2	4.8	○
-SLFA6- 90 CV	2	6	13	3.5	90	64	—	53	—	18	65	1	3.4	7.1	0.8	★
 -120 CV					120	94					95	1.2	4.3	7.5	1.2	○
-150 CV					150	124					125	1.3	5.2	8.4	1.9	○
-180 CV					180	154					155	1.4	6.1	9.1	2.8	○
-210 CV					210	184					185	1.5	6.6	9.2	4.8	○
F63-SLSA1/4- 90 CV	2	1/4	.37	.06	3.54	2.52	—	2.09	—	.71	2.56	2	2.9	6.7	1.6	○
-120 CV					4.72	3.70					3.74	2.2	3.6	7.5	2.4	○
-150 CV					5.91	4.88					4.92	2.5	4.5	8.2	3.7	○
-180 CV					7.09	6.06					6.10	2.8	5.4	8.8	5.5	○
-210 CV					8.27	7.24					7.24	3.4	7.2	9.8	7.5	○
-240 CV					9.45	8.43					8.43	3.6	7.8	10	9.6	○
-270 CV					10.63	9.61					9.65	4.2	9.1	10.1	11.3	▲
-300 CV					11.81	10.79					10.79	4.7	11.2	10.9	11.8	○
-SLRA1/4- 90 CV	2	1/4	.53	.14	3.54	2.52	—	2.09	—	.71	2.52	2.2	3.5	7.4	0.8	★
-120 CV					4.72	3.70					3.74	2.6	4.4	8	1.2	○
-150 CV					5.91	4.88					4.92	2.8	5.3	8.6	1.9	○
-180 CV					7.09	6.06					6.06	3.1	6.4	9.4	2.9	○
-210 CV					8.27	7.24					7.24	3.2	6.8	9.8	4.9	○

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg lbs	N	G grade	S	
F63-SLFA1/4- 90 CV	2	1/4	.53	.14	3.54	2.52	—	2.09	—	.71	2.52	2.2	3.5	7.4	0.8	★
-120 CV					4.72	3.70					3.74	2.6	4.4	8	1.2	
-150 CV					5.91	4.88					4.92	2.8	5.3	8.6	1.9	○
-180 CV					7.09	6.06					6.06	3.1	6.4	9.4	2.9	
-210 CV					8.27	7.24					7.24	3.2	6.8	9.8	4.9	
F63-SLSA8- 95-M42	1	8	11	1.5	95	42	27	15.4	25	24	78	0.7	1.9	5.7	3.4	○
-SLSB8- 95-M42	1	8	13	2.5	95	42	27	17.4	32	24	78	0.8	2.3	6	2.1	○
-SLRA8- 75-M22	1	8	14	3	75	22	27	16.3	25	24	58	0.7	1.9	5.7	1.1	○
- 95-M42					95	42		18.4			78	0.8		5	2	
-SLFB8- 75-M22	1	8	18	5	75	22	27	20.3	32	24	58	0.8	2.2	5.8	0.7	—
-SLSA8- 90 CV	2	8	11	1.5	90	64	—	53	—	24	65	0.9	2.9	6.7	1.4	○
-120 CV					120	94					94	1.1	3.8	7.2	2	
-150 CV					150	124					124	1.3	5	8.1	2.7	
-180 CV					180	154					155		5.2	8.4	5	
-210 CV					210	184					184	1.5	6.6	9.2	6.6	▲
-240 CV					240	214					214	1.8	7.8	9.1	8.3	
-270 CV					270	244					244	2.1	10.7	10.7	6.9	
-300 CV					300	274					274	2.3	11.9	10.8	8.9	
-SLRA8- 90 CV	2	8	16	4	90	64	—	53	—	24	65	1	3.4	7.1	0.7	○
-120 CV					120	94					95	1.2	4.6	8	1	
-150 CV					150	124					125	1.4	5.9	8.8	1.4	
-180 CV					180	154					155	1.6	7	9.2	2	
-210 CV					210	184					185		7.6	9.9	3.5	
-SLFA8- 90 CV	2	8	16	4	90	64	—	53	—	24	65	1	3.4	7.1	0.7	○
-120 CV					120	94					95	1.2	4.6	8	1	
-150 CV					150	124					125	1.4	5.9	8.8	1.4	
-180 CV					180	154					155	1.6	7	9.2	2	
-210 CV					210	184					185		7.6	9.9	3.5	
F63-SLSA5/16- 90 CV	2	5/16	.43	.06	3.54	2.52	—	2.09	—	.94	2.56	2	2.9	2.4	1.5	○
-120 CV					4.72	3.70					3.70	2.2	3.8	2.2	2.0	
-150 CV					5.91	4.88					4.88	2.7	5.1		2.8	
-180 CV					7.09	6.06					6.10	2.8	5.4	1.9	5.2	
-210 CV					8.27	7.24					7.17	3.2	7.4	2.2	6.0	▲
-240 CV					9.45	8.43					8.43	3.9	8.9		6.8	
-270 CV					10.63	9.61					9.65	4.5	10		8.5	
-300 CV					11.81	10.79					10.79	5	12.3	2.4	9.0	
-SLRA5/16- 90 CV	2	5/16	.63	.16	3.54	2.52	—	2.09	—	.94	2.52	2.2	3.5	2.9	0.7	○
-120 CV					4.72	3.70					3.70	2.6	4.8	2.7	1.0	
-150 CV					5.91	4.88					4.88	3	6.1	2.6	1.5	
-180 CV					7.09	6.06					6.06	3.5	7.3	2.5	2.1	
-210 CV					8.27	7.24					7.24	3.5	7.8	2.3	3.6	
-SLFA5/16- 90 CV	2	5/16	.63	.16	3.54	2.52	—	2.09	—	.94	2.52	2.2	3.5	2.9	0.7	○
-120 CV					4.72	3.70					3.70	2.6	4.8	2.7	1.0	
-150 CV					5.91	4.88					4.88	3	6.1	2.6	1.5	
-180 CV					7.09	6.06					6.06	3.5	7.3	2.5	2.1	
-210 CV					8.27	7.24					7.24	3.5	7.8	2.3	3.6	
F63-SLSA10-95-M42	1	10	13	1.5	95	42	27	17.4	25	30	74	0.8	2	5.2	2.6	○
-SLSB10-95-M42	1	10	16	3	95	42	27	20.4	32	30	74	0.8	2.3	6	1.4	○
-SLRA10-75-M22	1	10	16	3	75	22	27	18.3	25	30	54	0.8	1.9	5	1	○
-SLFB10-75-M22	1	10	22	6	75	22	27	24.3	32	30	54	0.8	2.3	6	0.6	—

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg lbs	N	G grade	S	
F63-SLSA10- 90 CV	2	10	13	1.5	90	64	—	53	—	30	65	0.9	2.9	6.7	1.3	○
-120 CV					120	94					95	1.2	4.4	7.7		
-150 CV					150	124					125	1.3	5.2	8.4	2.2	
-180 CV					180	154					154	1.5	6.3	8.8	3.4	
-210 CV					210	184					184	1.6	6.8	8.9	6	
-240 CV					240	214					212	2	9.4	9.8	5.8	
-270 CV					270	244					244	2.1	10.9	10.9	6.6	
-300 CV					300	274					274	2.3	12.2	11.1	8.5	
-SLRA10- 90 CV	2	10	19	4.5	90	64	—	53	—	30	65	1	3.5	7.3	0.6	○
-120 CV					120	94					95	1.2	4.6	8	0.9	
-150 CV					150	124					125	1.4	5.8	8.7	1.4	
-180 CV					180	154					155	1.6	7.2	9.4	2	
-210 CV					210	184					185		8	10.5	3.1	
-SLFA10- 90 CV	2	10	19	4.5	90	64	—	53	—	30	65	1	3.5	7.3	0.6	○
-120 CV					120	94					95	1.2	4.6	8	0.9	
-150 CV					150	124					125	1.4	5.8	8.7	1.4	
-180 CV					180	154					155	1.6	7.2	9.4	2	
-210 CV					210	184					185		8	10.5	3.1	
F63-SLSA3/8- 90 CV	3	3/8	.49	.06	3.54	2.52	—	2.09	—	1.18	2.56	2	2.9	2.4	1.3	○
-120 CV					4.72	3.70					3.74	2.3	3.8	2.1	2.2	
-150 CV					5.91	4.88					4.88	2.6	5.2	2.2	2.6	
-180 CV					7.09	6.06					6.06	3.1	6.4		3.6	
-210 CV					8.27	7.24					7.24	3.5	7.8	2.3	4.9	
-240 CV					9.45	8.43					8.46	4.1	9	2.2	6.0	
-270 CV					10.63	9.61					9.61	4.6	11.2	2.4	6.8	
-300 CV					11.81	10.79					10.79	5	12.5		8.8	
-SLRA3/8- 90 CV	3	3/8	.73	.185	3.54	2.52	—	2.09	—	1.18	2.52	2.2	3.5	2.9	0.7	○
-120 CV					4.72	3.70					3.70	2.6	4.8	2.7	1.0	
-150 CV					5.91	4.88					4.88	3	6.1	2.6	1.4	
-180 CV					7.09	6.06					6.06	3.4	7.4		2.0	
-210 CV					8.27	7.24					7.28	3.9	8.3	2.4	2.9	
-SLFA3/8- 90 CV	3	3/8	.73	.185	3.54	2.52	—	2.09	—	1.18	2.52	2.2	3.5	2.9	0.7	○
-120 CV					4.72	3.70					3.70	2.6	4.8	2.7	1.0	
-150 CV					5.91	4.88					4.88	3	6.1	2.6	1.4	
-180 CV					7.09	6.06					6.06	3.4	7.4		2.0	
-210 CV					8.27	7.24					7.28	3.9	8.3	2.4	2.9	
F63-SLSA12- 95-M42	1	12	15	1.5	95	42	27	19.4	32	30	74	0.8	2.3	6	1.8	○
-SLSB12- 95-M42	1	12	19	3.5	95	42	27	23.4	32	30	74	0.8	2.4	6.3	1.1	○
-SLRA12- 75-M22	1	12	20	4	75	22	27	22.3	25	30	54	0.9	2.1	4.9	0.8	○
-SLFB12- 75-M22	1	12	26	7	75	22	27	28.3	42	30	54	0.9	3	7	0.4	○
-SLSA12- 90 CV	2	12	15	1.5	90	64	—	53	—	30	64	1	3.4	7.1	0.9	○
-120 CV					120	94					94	1.2	4.7	8.2	1.2	
-150 CV					150	124					124	1.3	5.2	8.4	2.4	
-180 CV					180	154					154	1.5	6.5	9.1	3.3	
-210 CV					210	184					184	1.7	7.7	9.5	4.6	
-240 CV					240	214					212	2	9.6	10.1	5.5	
-270 CV					270	244					244	2.2	11.8	11.2	5.4	
-SLRA12- 90 CV	2	12	22	5	90	64	—	53	—	30	64	1	3.6	7.5	0.6	—
-120 CV					120	94					94	1.3	5.5	8.9	0.7	
-150 CV					150	124					124	1.5	6.7	9.4	1.1	
-180 CV					180	154					154	1.6	7.5	9.8	1.8	
-210 CV					210	184					184	1.7	8.5	10.5	2.8	

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg lbs	N	G grade	S	
F63-SLFA12- 90 CV	2	12	22	5	90	64	—	53	—	30	64	1	3.6	7.5	0.6	—
-120 CV					120	94					94	1.3	5.5	8.9	0.7	○
-150 CV					150	124					124	1.5	6.7	9.4	1.1	○
-180 CV					180	154					154	1.6	7.5	9.8	1.8	○
-210 CV					210	184					184	1.7	8.5	10.5	2.8	○
F63-SLSA1/2- 90 CV	3	1/2	.62	.06	3.54	2.52	—	2.09	—	1.18	2.52	2.1	3.6	7.8	0.8	○
-120 CV					4.72	3.70					3.70	2.5	4.9	8.9	1.2	○
-150 CV					5.91	4.88					4.88	2.6	5.3	9.4	2.4	○
-180 CV					7.09	6.06					6.06	3	6.7	10.3	3.4	○
-210 CV					8.27	7.24					7.17	3.6	9.3	11.9	3.6	○
-240 CV					9.45	8.43					8.35	4.1	11.5	13	4.3	▲
-270 CV					10.63	9.61					9.53	4.7	13.3		5.1	▲
-SLRA1/2- 90 CV	3	1/2	.89	.20	3.54	2.52	—	2.09	—	1.18	2.44	2.2	4	8.2	0.5	—
-120 CV					4.72	3.70					3.70	2.9	5.7	9.2	0.7	○
-150 CV					5.91	4.88					4.88	3.3	7	9.9	1.1	○
-180 CV					7.09	6.06					5.98	3.3	8.3	11.7	1.9	○
-210 CV					8.27	7.24					7.24	4.4	10.4	10.9	2.0	○
-SLFA1/2- 90 CV	3	1/2	.89	.20	3.54	2.52	—	2.09	—	1.18	2.44	2.2	4	8.2	0.5	—
-120 CV					4.72	3.70					3.70	2.9	5.7	9.2	0.7	○
-150 CV					5.91	4.88					4.88	3.3	7	9.9	1.1	○
-180 CV					7.09	6.06					5.98	3.3	8.3	11.7	1.9	○
-210 CV					8.27	7.24					7.24	4.4	10.4	10.9	2.0	○
F63-SLSB16- 90 CV	2	16	21	2.5	90	64	—	53	—	32	62	1.1	3.9	7.4	0.6	—
-120 CV					120	94					92	1.4	5.8	8.7	0.8	○
-150 CV					150	124					122	1.5	6.9	9.6	1.5	○
-180 CV					180	154					152	1.9	8.8	9.7	1.9	○
-210 CV					210	184					182	2	9.9	10.4	3	○
-240 CV					240	214					212	2.3	11.8	10.7	3.7	○
-270 CV					270	244					242	2.7	13.7	10.6	4.6	○
-SLFB16- 75-M22	1	16	32	8	75	22	27	34.3	42	32	54	1	3.1	6.5	0.3	○
F63-SLSB5/8- 90 CV	3	5/8	.82	.10	3.54	2.52	—	2.09	—	1.26	2.44	2.1	3.9	8.4	0.6	—
-120 CV					4.72	3.70					3.62	2.7	5.9	10.1	0.8	○
-150 CV					5.91	4.88					4.80	2.9	7	11	1.5	○
-180 CV					7.09	6.06					5.98	3.5	9	11.9	1.9	○
-210 CV					8.27	7.24					7.17	3.7	10.1	12.6	3.0	○
-240 CV					9.45	8.43					8.35	4.3	12.1	13.1	3.7	○
-270 CV					10.63	9.61					9.53	4.8	14.1	13.5	4.6	○
F63-SLSB20- 90 CV	2	20	26	3	90	64	—	51	—	40	62	1.1	4.2	8	0.5	—
-120 CV					120	94		53			92	1.4	6.2	9.3	0.8	○
-150 CV					150	124		122			1.6	7.6	9.9	1.3	○	
-180 CV					180	154		152			2	9.6	10.1	1.8	○	
-210 CV					210	184		182			2.3	11.6	10.6	2.3	○	
-240 CV					240	214		212			2.6	13.7	11	3	○	
-270 CV					270	244		242			3.1	16.3		3.4	○	
-SLFB20- 75-M22	1	20	38	9	75	22	27	40.3	50	40	53	1.1	3.6	6.9	0.3	○
F63-SLSB3/4- 90 CV	3	3/4	.99	.12	3.54	2.52	—	2.09	—	1.50	2.44	2.2	4.1	8.7	0.6	—
-120 CV					4.72	3.70					3.62	2.7	6.3	10.8	0.8	○
-150 CV					5.91	4.88					4.80	2.9	7.6	12	1.4	○
-180 CV					7.09	6.06					5.98	3.5	9.7	13	1.8	○
-210 CV					8.27	7.24					7.17	4	11.8	13.7	2.4	○
-240 CV					9.45	8.43					8.35	4.5	14	14.3	3.1	○
-270 CV					10.63	9.61					9.53	5.1	16.1	14.7	3.9	○
F63-SLFB25- 75-M22	1	25	45	10	75	22	27	47.3	50	45	53	1.1	3.7	7	0.2	○

15T

15TR3-SLSA3-60

MONO 3°

Rigidity value
($\mu\text{m/kgf}$)

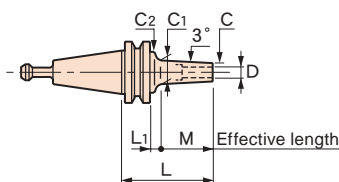
☞ P.118

Imbalance
value(g·mm)

(N)

G_{grade}(20000 min⁻¹)

☞ P.121

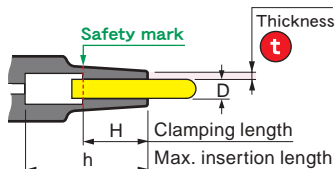


Compatibility table
for HRD-01S

[○] Available [—] Not available

Caution

Setting cutters... Be sure to insert the tool beyond the safety mark.



20000 min⁻¹

CODE	ϕD	ϕC	t	L	M	L1	$\phi C1$	$\phi C2$	H	h	Kg	(N)	G _{grade}	S	
15TR3-SLSA 3-40	3	6	1.5	40	22	5.5	8.3	18	9	46	0.1	0.3	6.3	4.7	○
				60	42		10.4			66				9.3	
15TR3-SLSA3.175-40	3.175	6.175	1.5	40	22	5.5	8.5	18	9	46	0.1	0.3	6.3	4.4	○
				60	42		10.6			66				8.8	
15TR3-SLSA 4-40	4	7	1.5	40	22	5.5	9.3	18	12	46	0.1	0.3	6.3	3.6	○
				60	42		11.4			66				7.3	
15TR3-SLSA 5-40	5	8	1.5	40	22	5.5	10.3	18	15	46	0.1	0.3	6.3	2.9	○
				60	42		12.4			66				5.9	
15TR3-SLSA 6-60	6	9	1.5	60	42	5.5	13.4	18	18	66	0.1	0.4	8.4	4.9	○
							-SLRA 6-35			12		3		35	19.6
15TR3-SLRA 8-35	8	14	3	35	19.6	2.9	16.1	—	20	51	0.1	0.3	6.3	0.9	—
15TR3-SLRA10-35	10	16	3	35	19.6	2.9	18.1	—	20	51	0.1	0.4	8.4	0.8	—

BROTHER

TC-20A
TC-20B



Feature

Shrink-fit Heater

MONO 3°
MONO CURVE

MONO Series

2PIECE type

UNO

HYPER
VERSION

Z

STRAIGHT
arbor

OTHERS

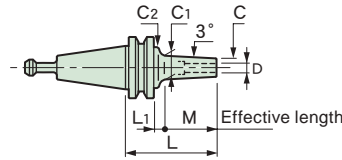
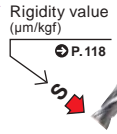
PERIPHERALS

Technical
data

S20T

S20TR2-SLRA8-35

MONO 3°



Compatibility table for HRD-01S

[○] Available [—] Not available

Caution

Setting cutters... Be sure to insert the tool beyond the safety mark.

Safety mark

Thickness t

Clamping length H

Max. insertion length h

CODE	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg	N	G grade	S	
S20TR2-SLSA 3-40	3	6	1.5	40	22	5.5	8.3	20	9	46	0.1	0.4	8.4	4.6	○
				60	42					66					9.2
S20TR2-SLSA3.175-40	3.175	6.175	1.5	40	22	5.5	8.5	20	9	46	0.1	0.4	8.4	4.4	○
				60	42					66					8.8
S20TR2-SLSA 4-40	4	7	1.5	40	22	5.5	9.3	20	12	46	0.1	0.4	8.4	3.6	○
				60	42					66					7.2
S20TR2-SLSA 5-40	5	8	1.5	40	22	5.5	10.3	20	15	46	0.1	0.4	8.4	2.8	○
				60	42					66					5.8
S20TR2-SLSA 6-60	6	9	1.5	60	42	5.5	13.4	20	18	66	0.1	0.5	10.5	4.7	○
				-SLRA 6-35	12					3					35
S20TR2-SLRA 8-35	8	14	3	35	19.6	2.9	16.1	—	20	51	0.1	0.4	8.4	0.9	—
S20TR2-SLRA10-35	10	16	3	35	19.6	2.9	18.1	—	20	51	0.1	0.5	10.5	0.8	—
S20TR2-SLRA12-45	12	20	4	45	32.5	—	23.4	—	30	51	0.2	0.6	6.3	0.8	—

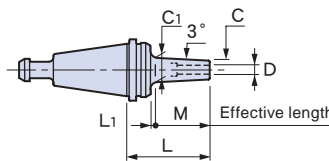
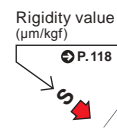
SUGINO
Xion-II-5AX
NSV9
V9



RS20

RS20-SLSA3.175-35

MONO 3°



Compatibility table for HRD-01S

[○] Available [—] Not available

Caution

Setting cutters... Be sure to insert the tool beyond the safety mark.

Safety mark

Thickness t

Clamping length H

Max. insertion length h

CODE	φD	φC	t	L	M	L ₁	φC ₁	H	h	Kg	N	G grade	S	
RS20-SLSA 3-35	3	6	1.5	35	22.1	2.9	8.3	9	46	0.1	0.2	4.2	5.2	○
-SLSA 3.175-35	3.175	6.175	1.5	35	22.1	2.9	8.5	9	46	0.1	0.2	4.2	4.9	○
-SLSA 4-35	4	7	1.5	35	22.1	2.9	9.3	12	46	0.1	0.2	4.2	4	○
-SLSA 5-35	5	8	1.5	35	22.1	2.9	10.3	15	46	0.1	0.2	4.2	3.2	○
-SLRA 6-30	6	12	3	30	17.1	2.9	13.8	18	46	0.1	0.2	4.2	1.1	—
-SLRA 8-30	8	14	3	30	17.2	2.8	15.8	20	51	0.1	0.3	6.3	0.9	—
-SLRA10-30	10	16	3	30	17.6	2.4	17.9	20	51	0.1	0.4	8.4	0.7	—

ROKU-ROKU
MEGA



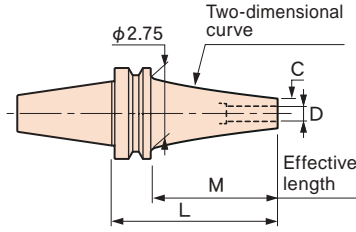
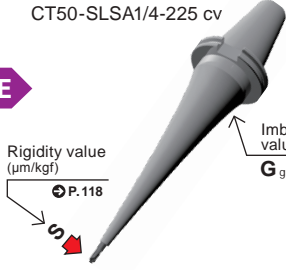
CT50

CT50-SLSA1/4-225 cv

MONO CURVE

Rigidity value (μm/kgf)
P.118

Imbalance value (gmm) (N)
G_{grade} (10000 min⁻¹)
P.121



Compatibility table for HRD-01S

[○] Available [—] Not available
[▲] Usable by raising the heating unit. → P.117

Option

- Retention knob

Caution



- Retention knob... Use a retention knob with hole, or remove the retention knob and heat it.
- Setting cutters... Be sure to insert the tool beyond the safety mark.

CV : Curve

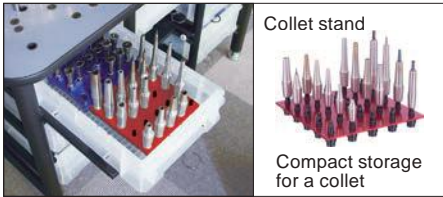
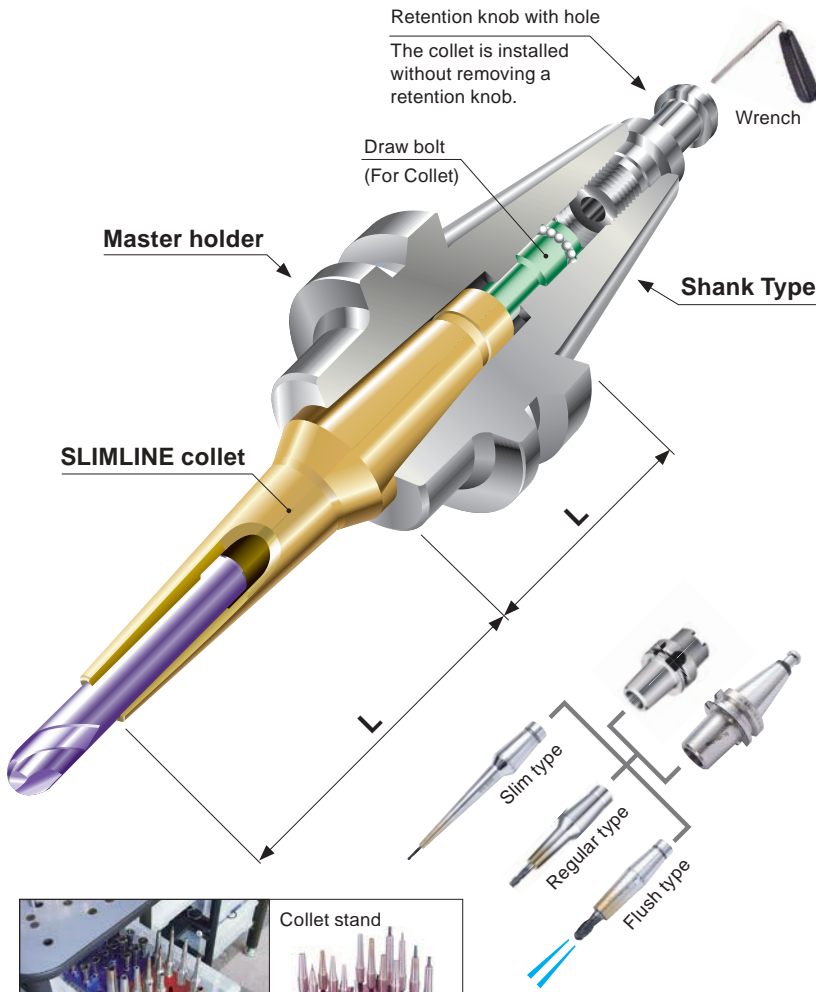
Thickness

10000 min⁻¹

CODE	φD	φC	t	L	M	H	h	lbs	N	G _{grade}	S	
CT50-SLSA3/16-165 CV	3/16	.31	.06	6.50	5.12	.59	8.66	8.4	13.7	3.8	2.6	○
-195 CV				7.68	6.30		9.84	8.7	14.7	3.9	4	
-225 CV				8.86	7.48		11.02	9.1	15.7	4	5.9	
-255 CV				10.04	8.66		12.20	9.4	17.4	4.3	8.2	▲
-285 CV				11.22	9.84		13.39	10.0	18.9	4.4	10.5	
-315 CV				12.40	11.02		14.57	10.5	20.5	4.5	13.3	
CT50-SLSA1/4 -165 CV	1/4	.37	.06	6.50	5.12	.71	8.66	8.5	13.1	3.6	2.4	○
-195 CV				7.68	6.30		9.84	9.6	16	3.9	2.5	
-225 CV				8.86	7.48		11.02	10.0	16.9	3.9	3.9	
-255 CV				10.04	8.66		12.20		19.2	4.5	5.6	▲
-285 CV				11.22	9.84		13.39	10.5	20.8	4.6	7.4	
-315 CV				12.40	11.02		14.57	11.1	22.4	4.7	9.5	
CT50-SLSA5/16-165 CV	5/16	.49	.06	6.50	5.12	.94	8.66	9.0	15.2	3.9	1.5	○
-195 CV				7.68	6.30		9.84	9.3	16.2	4	2.4	
-225 CV				8.86	7.48		11.02	9.4	17.5	4.3	3.9	
-255 CV				10.04	8.66		12.20	9.9	19.1	4.5	5.2	▲
-285 CV				11.22	9.84		13.39	10.8	21.6	4.6	6	
-315 CV				12.40	11.02		14.57	11.7	23.9	4.7	7.1	
-SLRA5/16-195 CV	5/16	.63	.16	7.68	6.30	.94	9.84	9.6	17	4.1	1.5	○
-225 CV				8.86	7.48		11.02	10.8	19.9	4.3	1.6	
-255 CV				10.04	8.66		12.20	10.9	20.4	4.3	2.6	▲
-285 CV				11.22	9.84		13.39	11.6	23.5	4.7	3.2	
-SLFA5/16-195 CV	5/16	.63	.16	7.68	6.30	.94	9.84	9.6	17	4.1	1.5	○
-225 CV				8.86	7.48		11.02	10.8	19.9	4.3	1.6	
-255 CV				10.04	8.66		12.20	10.9	20.4	4.3	2.6	▲
-285 CV				11.22	9.84		13.39	11.6	23.5	4.7	3.2	
CT50-SLSA3/8 -165 CV	3/8	.49	.06	6.50	5.12	1.18	8.66	8.9	14.9	3.9	1.5	○
-195 CV				7.68	6.30		9.84	9.1	15.8	4	2.4	
-225 CV				8.86	7.48		11.02	9.3	16.7	4.2	3.8	▲
-255 CV				10.04	8.66		12.20	9.8	19.3	4.6	5	
-285 CV				11.22	9.84		13.39	11.0	22.5	4.7	5.2	
-315 CV				12.40	11.02		14.57	11.5	24.4	4.9	6.9	

CODE	φD	φC	t	L	M	H	h	lbs	N	G grade	S	
CT50-SLRA3/8-165 CV	3/8	.73	.18	6.50	5.12	1.18	8.66	8.8	15.4	4.1	1	—
-195 CV				7.68	6.30		9.84	9.2	16.9	4.3	1.5	○
-225 CV				8.86	7.48		11.02	10.1	18.5	4.3	1.9	▲
-255 CV				10.04	8.66		12.20		20.1	4.6	3	
-285 CV				11.22	9.84		13.39	11.3	23.3	4.8	3.3	
-SLFA3/8-165 CV	3/8	.73	.18	6.50	5.12	1.18	8.66	8.8	15.4	4.1	1	—
 -195 CV				7.68	6.30		9.84	9.2	16.9	4.3	1.5	○
-225 CV				8.86	7.48		11.02	10.1	18.5	4.3	1.9	▲
-255 CV				10.04	8.66		12.20		20.1	4.6	3	
-285 CV				11.22	9.84		13.39	11.3	23.3	4.8	3.3	
CT50-SLSA1/2-165 CV	1/2	.62	.06	6.50	5.12	1.18	5.28	7.3	15.8	5	1.2	○
-195 CV				7.68	6.30		6.46	9.0	17.5	4.5	1.9	
-225 CV				8.86	7.48		6.89	9.4	19.1	4.7	2.7	
-255 CV				10.04	8.66		7.48	9.9	20.8	4.9	3.8	▲
-285 CV				11.22	9.84		9.92	10.0	26.5	6.1	4.7	
-315 CV				12.40	11.02		11.10	10.8	28.8	6.2	5.2	
-SLRA1/2-165 CV	1/2	.89	.20	6.50	5.12	1.18	12.28	11.6	16.4	3.3	0.8	—
-195 CV				7.68	6.30		5.20	8.6	17.8	4.8	1.3	
-225 CV				8.86	7.48		5.71	9.2	21	5.3	1.4	○
-255 CV				10.04	8.66			11.0	22.4	4.7	2.1	▲
-285 CV				11.22	9.84		8.74	11.9	29.6	5.8	2.3	
-SLFA1/2-165 CV	1/2	.89	.20	6.50	5.12	1.18	9.92	10.6	16.4	3.6	0.8	—
 -195 CV				7.68	6.30		5.20	8.6	17.8	4.8	1.3	
-225 CV				8.86	7.48		5.71	9.2	21	5.3	1.4	○
-255 CV				10.04	8.66			11.0	22.4	4.7	2.1	▲
-285 CV				11.22	9.84		8.74	11.9	29.6	5.8	2.3	
CT50-SLSB5/8-165 CV	5/8	.82	.10	6.50	5.12	1.26	8.66	8.6	17.5	4.7	1.1	
-195 CV				7.68	6.30		9.84	9.3	20.2	5	1.5	
-225 CV				8.86	7.48		11.02	9.9	22.9	5.4	2	
-255 CV				10.04	8.66		12.20	10.1	24.3	5.6	3.1	
-285 CV				11.22	9.84		13.39	10.7	27	5.9	3.9	
-315 CV				12.40	11.02		14.57	11.4	29.7	6	4.8	
CT50-SLSB3/4-165 CV	3/4	.99	.12	6.50	5.12	1.50	8.66	9.1	19	4.8	0.8	
-195 CV				7.68	6.30		9.84	9.7	21.9	5.2	1.2	
-225 CV				8.86	7.48		11.02	9.8	23.9	5.7	1.8	
-255 CV				10.04	8.66		12.20	10.4	26.8	6	2.5	
-285 CV				11.22	9.84		13.39	11.1	29.7	6.2	3.2	
-315 CV				12.40	11.02		14.57	11.7	32.6	6.5	4.1	

2 PIECE type



12 type

F type master holder. Coolant-through nozzles are available. (only for 12 type)

3°
5 μm
φ3~12
1/8"~1/2

φ26

200E

Cutter through
Flush through
Nozzle through

8 type

The shortest 60

3 μm
φ3~8

φ18

60E

Cutter through
Flush through

6 type

The shortest 52

3 μm
φ3~6

φ14

20E

Cutter through

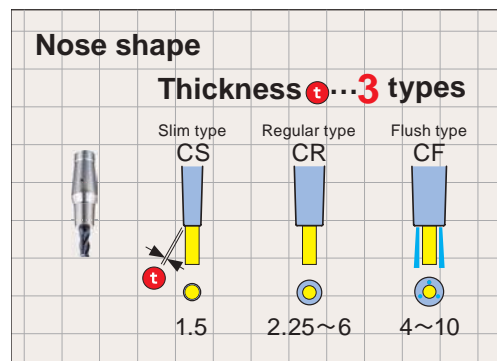
BT40 - SL K 12 - 35 F

Shank Type SLIMLINE Type L Coolant-through

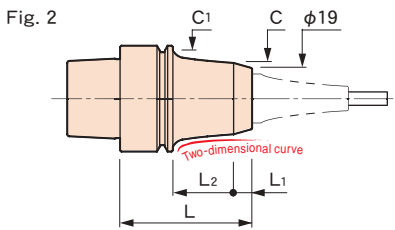
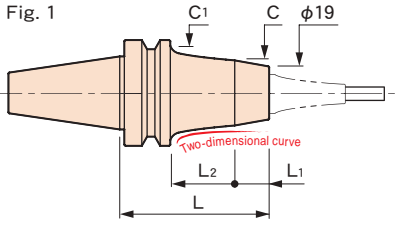
CS 12 - 3 - 110

Collet type φD L

PAGE	Type	Models
76	12 type	BT30, BT40, BT50 A50, A63, A100 E50, F63 DN40, DN50 CT40, CT50
75	8 type	BT30, BT40 A40, A50, A63 E40, E50, F63
74	6 type	BT30 A40, A50 E32, E40, E50



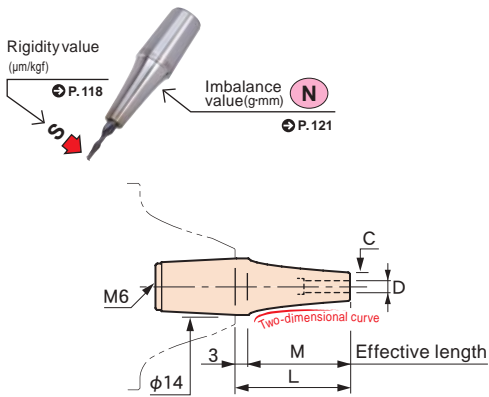
Master holder 6 type



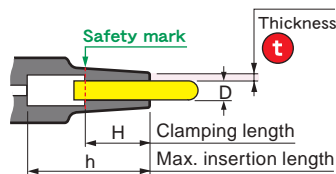
CODE	Fig.	L	L ₁	L ₂	φC	φC ₁	Kg	N
BT30-SLK 6-35-MAS1	1	35	13	—	—	34	0.5	1.4
-MAS2								
BT30-SLK 6-65-MAS1	1	65	15	28	25.1	34	0.6	2.2
-MAS2								
A 40-SLK 6-37	2	37	17	—	—	34	0.2	3
50								
A 50-SLK 6-42	2	42	16	—	—	42	0.4	5.3
55								
E 32-SLK 6-37	2	37	7	10	26	—	0.2	1.3
-50								
E 40-SLK 6-37	2	37	17	—	—	34	0.3	1.7
-50								
E 50-SLK 6-42	2	42	16	—	—	42	0.5	3.4
-55								

- Option**
 - SLIMLINE collet 6 type
 - Wrench.
- Std.Access.**
 - Coolant duct (HSK-A)
 - Retention knob (BT30)→p.104
- Note**
 - A dedicated retention knob is supplied with the BT30 as a standard accessory. When ordering, specify machine maker and model number. To replace the retention knob, please contact us.
- Caution**
 - If the SLIMLINE collet can't be removed from a master holder, follow the procedure on p.116.
 - HSK-E shank doesn't come with a coolant duct and cannot be attached. Consult us if you need it.

SLIMLINE collet 6 type



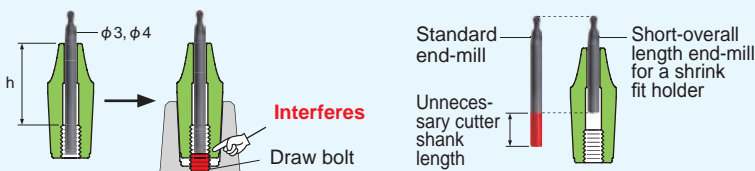
- Note**
 - $\downarrow S$ refers to the deflection value of an E32-SLK6-37 and the SLIMLINE collet 6 type combination. The values are comparable for any shank combination.
- Caution**
 - Setting cutters...Be sure to insert the tool beyond the safety mark.



CODE	φD	φC	t	L	M	H	S	N	g	h
CS6-3-15	3	6	1.5	15	12	9	1.5	0.1	20	24
-30				30	27		3.2	0.2	30	39
-45				45	42		9	0.3	40	54
CR6-3-30	3	7.5	2.25	30	27	9	1.3	0.1	30	39
-45				45	42		6.2	0.3	40	54
CS6-4-15	4	7	1.5	15	12	12	1.2	0.1	30	24
-30				30	27		2.8	0.2	39	
-45				45	42		7.9	0.4	40	54
CR6-4-30	4	10	3	30	27	12	1	0.1	30	39
-45				45	42		4.4	0.5	50	54
CS6-6-15	6	9	1.5	15	12	15	1	0.1	20	24
-30				30	27		2.4	0.3	30	35
-45				45	42		6.5	0.5	40	
CR6-6-30	6	12	3	30	27	15	0.8	0.2	20	35
-45				45	42		4	0.6		

⚠ Don't insert the cutter shank to the max. insertion length (h).

If the cutting tool shank face touches the bottom of the holder, the collet will not be installed properly and it may cause poor accuracy. Be sure to pay attention to this by using CS6 and CS8 with L = 15 and 25, because their "h" dimension is very short. We recommend you use the short overall length tool for SLIMLINE (6 type*8 type) because its insertion length is short. When cutting off a tool shank, please remove any burrs on the cutting surface of the tool shank carefully.



Wrench (both for 6 and 8 type)

Used for clamping of master holders (type 6 & type 8) and SLIMLINE collet (type 6 & type 8).



CODE	
TW- 4	HSK-A, E, F, BT40
DW-14	BT30

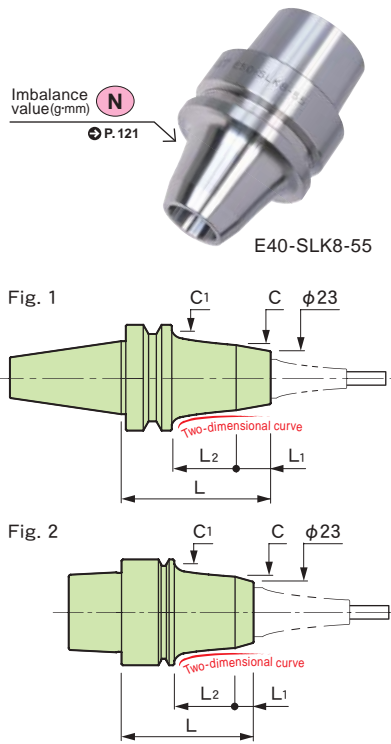
Holder stand

Ⓟ P.12



Feature
Shrink-fit Heater
MONO 3°
MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS
Technical data

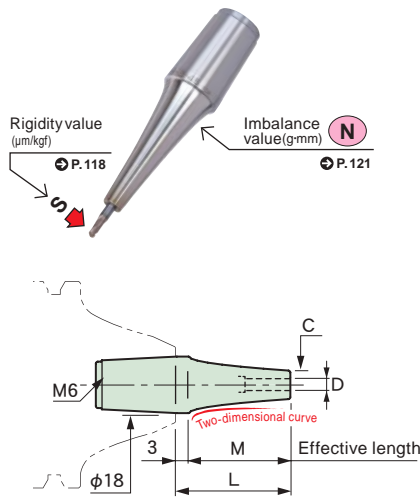
Master holder 8 type



CODE	Fig.	L	L ₁	L ₂	φC	φC ₁	Kg	N
BT30-SLK8-35-MAS1	1	35	13	—	—	34	0.4	1.5
-35-MAS2								
-SLK6-65-MAS1								
-65-MAS2								
BT40-SLK8-40	2	40	13	—	—	53	1	1.8
-70		70	15	28	31.2		1.2	2.5
A 40-SLK8-50	2	50	7	23	27	34	0.3	2.5
-70		70	15	35	27.3		0.4	3.3
A 50-SLK8-55	2	55	7	22	28.1	42	0.5	4
-75		75	15	34	28.7		0.6	4.8
A 63-SLK8-55	2	55	7	22	29.5	53	0.8	5.7
-75		75	15	34	30.5		0.9	5.9
E 40-SLK8-50	2	50	7	23	27	34	0.3	2.1
-70		70	15	35	27.3		0.4	2.9
E 50-SLK8-55	2	55	7	22	28.1	42	0.6	2.7
-75		75	15	34	28.7		0.7	3.5
F 63M-SLK8-55	2	55	7	22	29.5	53	0.8	4.4
-75		75	15	34	30.5		1	5.2

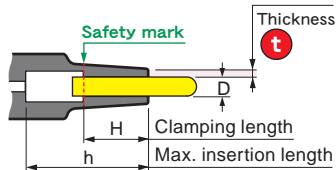
- Option**
 - SLIMLINE collet 8 type
 - Wrench
- Std. Access.**
 - Coolant duct (HSK-A)
 - Retention knob (BT30)→p.104
- Note**
 - A dedicated retention knob is supplied with the BT30 as a standard accessory. When ordering, specify machine maker and model number. To replace the retention knob, please contact us.
- Caution**
 - If the SLIMLINE collet can't be removed from a master holder, follow the procedure on p.116.
 - HSK-E shank doesn't come with a coolant duct and cannot be attached. Consult us if you need it.

SLIMLINE collet 8 type



CODE	φD	φC	t	L	M	H	S	N	g	h
CS8-3-25	3	6	1.5	25	22	9	2.1	0.2	60	37.5
				45	42		4.8	0.4	70	57.5
				65	62		10.3	0.6	80	77.5
CR8-3-45	3	7.5	2.25	45	42	9	3.6	0.5	70	57.5
				65	62		7.4	0.7	90	77.5
CF8-3-45	3	9.5	3.25	45	42	9	2.8	0.5	80	57.5
				65	62		5.3	0.8	100	77.5
CS8-4-25	4	7	1.5	25	22	12	1.8	0.3	60	37.5
				45	42		4.4	0.5	70	57.5
				65	62		9.2	0.6	80	77.5
CR8-4-45	4	10	3	45	42	12	2.7	0.6	80	57.5
				65	62		5.3	0.8	100	77.5
CF8-4-45	4	12	4	45	42	12	2.3	0.7	90	57.5
				65	62		4.2	0.9	110	77.5
CS8-6-25	6	9	1.5	25	22	15	1.5	0.3	60	35
				45	42		3.7	0.6	80	
				65	62		7.6	0.8	90	
CR8-6-45	6	12	3	45	42	15	2.5	0.7	90	35
				65	62		4.8	1	110	
CF8-6-45	6	14	4	45	42	15	2.1	0.8	100	35.0
				65	62		3.9	1.1	120	
CS8-8-25	8	11	1.5	25	22	20	1.4	0.4	60	37
				45	42		3.3	0.7	70	49
CR8-8-45	8	14	3	45	42	20	2.4	0.8	90	49
CF8-8-45	8	16	4	45	42	20	2.1	1.1	110	49

- Note**
 - S refers to the deflection value of an E40-SLK8-50 and SLIMLINE collet type 8 combination. The values are comparable for any shank combination.
- Caution**
 - Setting cutters...Be sure to insert the tool beyond the safety mark.



Master holder 12 type

Feature

Shrink-fit Heater

MONO 3°
MONO CURVE

MONO Series

2PIECE type

UNO

HYPER
VERSION

Z

STRAIGHT
arbor

OTHERS

PERIPHERALS

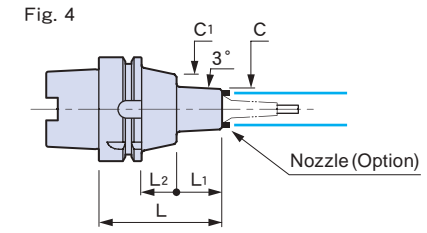
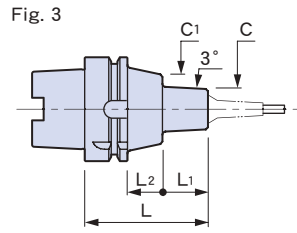
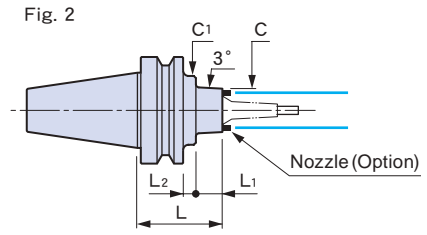
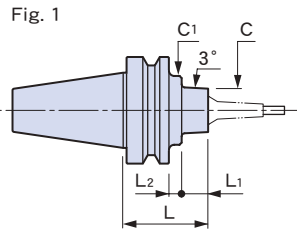
Technical
data

BT40-SLK12-75



Imbalance
value(gmm) **N**
⊕P.121



A63-SLK12-75F



CODE	Fig.	L	φC	L ₁	L ₂	φC ₁	Kg	N
BT30-SLK12- 35-MAS1	1	35	38	13	—	—	0.4	1
-MAS2								
BT40-SLK12- 45	1	45	38	18			1.1	1.4
- 45F	2		41					1.6
- 75	1	75	38	48			1.4	
- 75F	2		41					1.8
-135F		135		108			2.2	3.2
BT50-SLK12- 75	1	75	38	25	12	65	4	4.7
- 75F	2		41					4.9
-105F		105		55			4.4	5.3
-135F		135		85			4.7	5.7
-225	1	225	38	175			6.4	14.8
-315		315		225	52		11	31.3
A 50-SLK12- 75	3	75	38	49	—	—	0.8	4.8
A 63-SLK12- 75	3	75	38	49	—	—	1	5
- 75F	4		41				1.1	5.5
-135	3	135	38	109			1.7	8.5
-135F	4		41				1.9	8.6
A100-SLK12-105	3	105	38	43	33	65	3.4	41.3
-105F	4		41				3.5	41.5
-135F		135		73			3.8	42.2
-225	3	225	38	163			5.4	36.3
-315		315		253			6.4	46.5
E 50-SLK12- 75	3	75	38	49	—	—	0.8	2.9
F63M-SLK12- 75	3	75	38	49	—	—	1	3.4

CODE	Fig.	L	φ C	L1	L2	φ C1	 Kg lbs	 N
DN40AD-SLK12- 45	1	45	38	13.8	12.1	45	1	4.6
	2		41	7.9	18			4.3
	1	75	38	43.8	12.1	1.3	5.8	
	2		41	55.9	—		5.5	
DN50AD-SLK12- 75	1	75	38	40	15.9	70	3.4	12.6
	2						3.5	12.3
			135	41	100	4.3	19	
CT40-SLK12- 45	1	1.77	1.61	1.02	—	1.75	2.4	2.4
	2						2.2	2.8
	1	2.95	1.50	2.20	2.9	3.5		
	2		1.61		3.1	3.9		
			5.31	4.56	4.6	6.8		
CT50-SLK12- 75	1	2.95	1.50	1.57	0.63	2.75	7.5	7.9
	2		1.61				7.7	8.3
			4.13	2.76	8.6	11.3		
			5.31	3.94	9.5	14.4		
			8.86	7.48	12.6	23		
			12.40	8.86	2.79	17.6	28	

DIN

CAT.

■ Option

- SLIMLINE collet 12type
- Wrench (W-135)
- Nozzles (nozzle model: NOZ)
- Retention knob (BT/ CT/ DN)

■ Std. Access.

- Coolant duct
- Retention knob (BT30)

■ Note

- A dedicated retention knob is supplied with the BT30 as a standard accessory. When ordering, specify machine maker and model number. To replace the retention knob, please contact us.

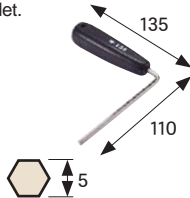
■ Caution

- If the SLIMLINE collet can't be removed from a master holder, follow the procedure on p.116.

Wrench

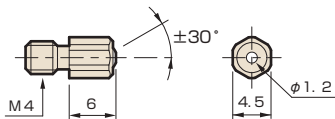
Required for clamping the master holder and SLIMLINE collet.

CODE
W-135



Nozzle (For F-type)

CODE	Q'ty
NOZ-M4-12	12
-60	60



■ Std. Access.

- Tightening wrench

■ Note

- Four nozzles are required on the flush type master holder.

Holder stand

Stands for SLIMLINE COLLETS, STRAIGHT arbor and compact holders (HSK-E25, E32). Selectable from four colors. Convenient to make arrangements by color-coding, etc.

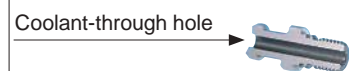
CODE	Colors	Front face	Back face	Storage capacity
SDKT-RE	Red	SLIMLINE collet STRAIGHT arbor	Small shank holders (HSK-E25/E32)	25 pieces each
-BL	Blue			
-GR	Green			
-GD	Gold			

Size : 190×190 [mm]

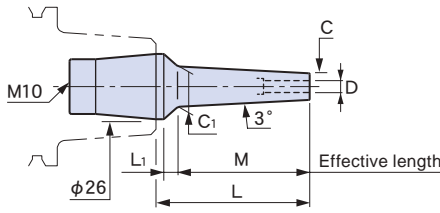
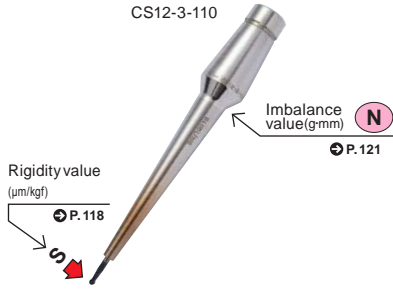


Retention knob with hole

There is no need to remove a retention knob with 6mm coolant-through hole when tightening or loosening SLIMLINE taper adapters.



SLIMLINE collet 12 type

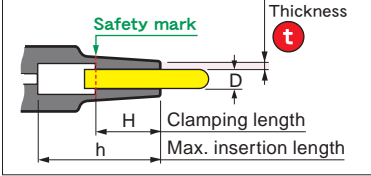


Note

- S refers to the deflection value of an BT40-SLK12-45 and the SLIMLINE collet 12 type combination. The values below are comparable for any shank combination.


Caution


- Setting cutters... Be sure to insert the tool beyond the safety mark.



CODE	φD	φC	t	L	M	L ₁	φC ₁	H	S	N	Kg lbs	Max. insertion length			
CS12- 3- 35	3	6	1.5	35	22	9.5	8.4	10	4.8	0.5	0.2	60			
				55	42		10.5		9.5						
				80	67		13.1		15				0.7		
				110	97		16.2		20.6				0.8		
CR12- 3- 35	3	7.5	2.25	35	22	9.5	9.9	10	2.9	0.5	0.2	60			
				55	42		12		5.5						
				80	67		14.6		8.9				0.7		
CF12- 3- 35	3	9.5	3.25	35	22	9.5	11.9	10	1.9	0.5	0.2	60			
				55	42		14		3.3				0.6		
				80	67		16.6		5.3				0.8		
CS12-3.175- 35	3.175	6.175	1.5	35	22	9.5	8.5	10	4.6	0.5	0.2	60			
				55	42		10.6		9						
				80	67		13.2		14.3				0.7		
				110	97		16.4		19.7				0.8		
CS12-1/8- 35	1/8	.24	.059	1.38	.87	.37	.33	.39	4.4	0.5	0.35	2.56			
				2.17	1.65		.42		8.7				0.6	0.37	3.35
				3.15	2.64		.52		14				0.7	0.42	4.33
				4.33	3.82		.64		19.3				0.9	0.49	5.51
CR12-1/8- 35	1/8	.36	.118	1.38	.87	.37	.45	.39	2	0.5	0.37	2.56			
				2.17	1.65		.53		3.5				0.6	0.42	3.35
				3.15	2.64		.64		5.7				0.8	0.49	4.33
CF12-1/8- 35	1/8	.38	.128	1.38	.87	.37	.47	.39	1.8	0.6	0.40	2.56			
				2.17	1.65		.55		3.1				0.7	0.42	3.35
				3.15	2.64		.66		5.1				0.9	0.49	4.33
CS12- 4- 35	4	7	1.5	35	22	9.5	9.4	12	3.8	0.5	0.2	60			
				55	42		11.5		7.5						
				80	67		14.1		11.9				0.7		
				110	97		17.2		16.6				0.9		
CR12- 4- 35	4	10	3.25	35	22	9.5	12.4	12	1.7	0.5	0.2	60			
				55	42		14.5		3.1				0.6		
				80	67		17.1		5.1				0.8		
CF12- 4- 35	4	12	4	35	22	9.5	14.4	12	1.3	0.6	0.2	60			
				55	42		16.5		2.2				0.8		
				80	67		19.1		3.4				0.9		
CS12-3/16- 35	3/16	.31	.059	1.38	.87	.37	.40	.59	3.1	0.6	0.35	2.56			
				2.17	1.65		.48		6.2				0.7	0.37	3.35
				3.15	2.64		.58		10.3				0.8	0.42	4.33
				4.33	3.82		.71		14.2				1	0.53	5.51
CR12-3/16- 35	3/16	.42	.118	1.38	.87	.37	.51	.59	1.5	0.6	0.37	2.56			
				2.17	1.65		.60		2.7				0.7	0.42	3.35
				3.15	2.64		.70		4.5				0.9	0.51	4.33

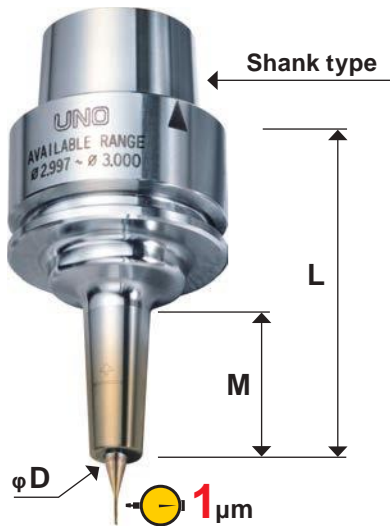
Feature: Shrink-fit Heater
 MONO 3° MONO CURVE
 MONO Series
 2PIECE type
 UNO
 HYPER VERSION
 Z
 STRAIGHT arbor
 OTHERS
 PERIPHERALS
 Technical data

CODE	φD	φC	t	L	M	L ₁	φC ₁	H	S	N		Max. insertion length	
CF12-3/16 - 35	3/16	.50	.157	1.38	.87	.37	.59	.59	1.2	0.7	0.40	2.56	
- 55				2.17	1.65		.68		1.9	0.8	0.46	3.35	
- 80				3.15	2.64		.78		3.1	1	0.55	4.33	
CS12- 5- 35	5	8	1.5	35	22	9.5	10.4	15	3	0.5	0.2	60	
- 55				55	42		12.5		6	0.6		80	
- 80				80	67		15.1		9.7	0.8		105	
-110				110	97		18.2		13.6	1		135	
CS12- 6- 35	6	9	1.5	35	22	9.5	11.4	18	2.4	0.5	0.2	60	
- 55				55	42		13.5		4.9	0.7		80	
- 80				80	67		16.1		8	0.8		105	
-110				110	97		19.2		11.4	1		135	
CR12- 6- 35	6	12	3.25	35	22	9.5	14.4	18	1.3	0.6	0.2	60	
- 55				55	42		16.5		2.4	0.7		80	
- 80				80	67		19.1		3.9	0.9		105	
CF12- 6- 35	6	14	4	35	22	9.5	16.4	18	1	0.7	0.2	60	
- 55				55	42		18.5		1.7	0.9		80	
- 80				80	67		21.1		2.7			0.3	105
CS12-1/4- 35	1/4	.37	.059	1.38	.87	.37	.46	.71	2.2	0.6	0.35	2.56	
- 55				2.17	1.65		.54		4.5	0.7	0.40	3.35	
- 80				3.15	2.64		.64		7.4	0.9	0.46	4.33	
-110				4.33	3.82		.77		10.5	1.1	0.57	5.51	
CR12-1/4- 35	1/4	.49	.118	1.38	.87	.37	.58	.71	1.2	0.6	0.40	2.56	
-55				2.17	1.65		.66		2.2	0.8	0.44	3.35	
-80				3.15	2.64		.76		3.7	1	0.55	4.33	
CF12-1/4- 35	1/4	.56	.157	1.38	.87	.37	.66	.71	1	0.8	0.42	2.56	
-55				2.17	1.65		.74		1.9	0.9	0.49	3.35	
-80				3.15	2.64		.84		2.6	1.1	0.60	4.33	
CS12- 7- 35	7	10	1.5	35	22	9.5	12.4	20	2	0.6	0.2	60	
- 55				55	42		14.5		4.1	0.7		80	
- 80				80	67		17.1		6.8	0.9		105	
-110				110	97		20.2		9.7	1.2		0.3	135
CS12-5/16- 35	5/16	.43	.059	1.38	.87	.37	.52	.98	1.6	0.6	0.37	2.56	
- 55				2.17	1.65		.60		3.3	0.8	0.40	3.35	
- 80				3.15	2.64		.71		5.6	1	0.49	4.33	
-110				4.33	3.82		.83		8.1	1.2	0.62	5.51	
CR12-5/16- 35	5/16	.55	.118	1.38	.87	.37	.64	.98	1	0.7	0.40	2.56	
-55				2.17	1.65		.72		1.9	0.8	0.46	3.35	
-80				3.15	2.64		.83		3.1	1	0.57	4.33	
CF12-5/16- 35	5/16	.55	.118	1.38	.87	.37	.64	.98	1	0.7	0.40	2.56	
-55				2.17	1.65		.72		1.9	0.8	0.46	3.35	
-80				3.15	2.64		.83		3.1	1	0.57	4.33	
CS12- 8- 35	8	11	1.5	35	22	9.5	13.4	25	1.6	0.6	0.2	60	
- 55				55	42		15.5		3.4	0.7		80	
- 80				80	67		18.1		5.6	0.9		105	
-110				110	97		21.2		8.2	1.2		0.3	135
CR12- 8- 35	8	14	3.25	35	22	9.5	16.4	25	1.1	0.6	0.2	60	
- 55				55	42		18.5		1.9	0.8		80	
- 80				80	67		21.1		3.1	1		0.3	105
CF12- 8- 35	8	16	4	35	22	9.5	18.4	25	0.9	0.8	0.2	60	
- 55				55	42		20.5		1.4	1		80	
- 80				80	67		23.1		2.3	1.2		0.3	105
CS12- 9- 35	9	12	1.5	35	22	9.5	14.4	30	1.4	0.7	0.2	60	
- 55				55	42		16.5		2.9	0.9			
- 80				80	67		19.1		4.8	1.1			
-110				110	97		22.2		7.1	1.3		0.3	
CS12-3/8- 35	3/8	.49	.059	1.38	.87	.37	.58	1.18	1.3	0.7	0.35	2.36	
- 55				2.17	1.65		.67		2.6	0.8	0.42		
- 80				3.15	2.64		.77		4.4	1	0.51		
-110				4.33	3.82		.89		.98	6.4	1.3		0.66

CODE	φD	φC	t	L	M	L ₁	φC ₁	H	S	N		Max. insertion length				
CR12-3/8-35	3/8	.61	.118	1.38	.87	.37	.70	1.18	0.9	0.7	0.40	2.36				
-55				2.17	1.65		.78						1.6	0.9	0.49	
-80				3.15	2.64		.89						2.6	1.1	0.62	
CF12-3/8-35	3/8	.69	.157	1.38	.87	.37	.78	1.18	0.8	0.9	0.42	2.36				
-55				2.17	1.65		.86						1.3	1.1	0.53	
-80				3.15	2.64		.97						2	1.3	0.68	
CS12-10-35	10	13	1.5	35	22	9.5	15.4	30	1.3	0.8	0.2	60				
-55				55	42		17.5						2.5	0.9		
-80				80	67		20.1						4.3	1.1		
-110				110	97		23.2						6.2	1.4	0.3	
CR12-10-35	10	16	3.25	35	22	9.5	18.4	30	0.9	0.7	0.2	60				
-55				55	42		20.5						1.6	0.9		
-80				80	67		23.1						2.6	1.1	0.3	
CF12-10-35	10	18	4	35	22	9.5	20.4	30	0.7	0.9	0.2	60				
-55				55	42		22.5						1.1	1.1		
-80				80	—		—						1.9	1	0.3	
CS12-11-35	11	14	1.5	35	22	9.5	16.4	30	1.1	0.9	0.2	60				
-55				55	42		18.5						2.3	1		
-80				80	67		21.1						3.8	1.3		
-110				110	97		24.2						5.6	1.5	0.3	
CS12-12-35	12	15	1.5	35	22	9.5	17.4	30	1	1	0.2	60				
-55				55	42		19.5						2.1	1.1		
-80				80	67		22.1						3.5	1.4		
-110				110	—		—						5	1.3	0.3	
CR12-12-35	12	20	4.25	35	22	9.5	22.4	30	0.7	0.9	0.2	60				
-55				55	42		24.5						1.1	1.1		
-80				80	—		—						1.9	1	0.3	
CF12-12-35	12	20	4	35	22	9.5	22.4	30	0.7	1	0.2	60				
-55				55	42		24.5						1.1	1.2		
-80				80	—		—						1.9	1.1	0.3	
CS12-1/2-35	1/2	.62	.059	1.38	.87	.37	.71	1.18	0.9	0.9	0.33	2.36				
-55				2.17	1.65		.79						1.9	1.1	0.42	
-80				3.15	2.64		.89						3.1	1.3	0.55	
-110				4.33	3.68		.50						1	1.7	0.77	
CR12-1/2-35	1/2	.81	.157	1.38	.87	.37	.91	1.18	0.6	1	0.42	2.36				
-55				2.17	1.99		—						—	1.1	0.9	0.55
-80				3.15	1.80		1.20						1	1.8	2.2	0.75
CF12-1/2-35	1/2	.81	.157	1.38	.87	.37	.91	1.18	0.6	1.1	0.40	2.36				
-55				2.17	1.99		—						—	1.1	1	0.55
-80				3.15	1.80		1.20						1	1.8	2.3	0.75

UNO

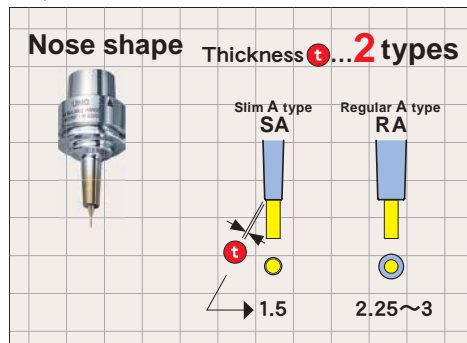
run-out accuracy **1 μm**



E32 - SL SA 3 - 50 - M42 UNO

Shank type SLIMLINE φD L Effective length SLIMLINE UNO

- E25
- E32
- E40
- E50
- F63



Required cutter shank tolerance



- φD=h4 tolerance
- Roundness = 0.3μm
- Cylindricity = 0.5μm

Recommended cutting tools



株式会社 イワタツール
IWATA TOOL Co., Ltd.

NS TOOL

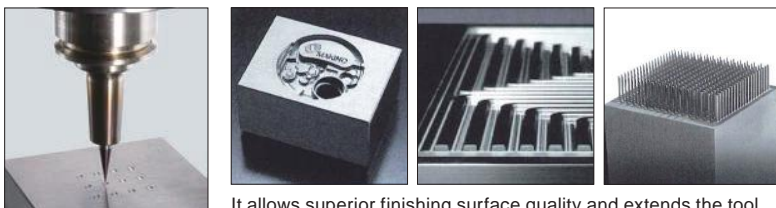
住友電工
SUMITOMO ELECTRIC

三菱日立ツール
Mitsubishi Hitachi Tool

KYOWA



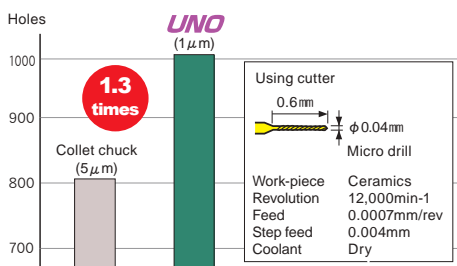
株式会社 アゼ



It allows superior finishing surface quality and extends the tool life of micro-cutting tools.

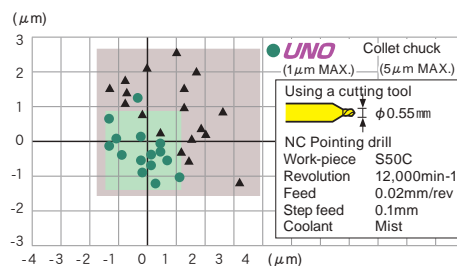
Runout accuracy Tool life

Number of machined small-diameter holes



Positioning accuracy

Dispersion of run-out of drill and hole positioning accuracy



Eye-mark (▲) at the highest run-out direction.

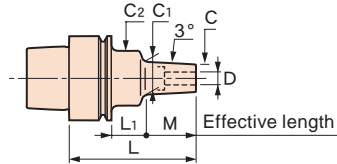
We inspect all the holders and mark "▲" at the highest run-out point.



Delivered with the accuracy inspection sheet

UNO

E32-SLRA4-50-M22 UNO

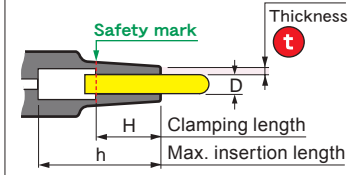


Note

- SLIMLINE UNO is available for other shank designs and internal bore sizes not listed in this chart. For more information, please contact us.

Caution

- HSK-E and F shank don't come with a coolant duct and cannot be attached. Consult us if you need it.
- Setting cutters: Be sure to insert the tool beyond the Safety mark.



CODE	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	Kg	N	G grade	S	Thickness	20000 min ⁻¹		
E25-SLRA3 -35 UNO	3	7.5	2.25	35	17	8	9.3	18	9	29	0.6	0.37	1.3	2.3				
-SLRA4 -35 UNO	4	10	3				11.8		12							0.38	1.3	1.4
-SLSA3.175-35 UNO	3.175	6.175	1.5				8		9							0.37	1.3	3.5
E32-SLRA3 -50-M22 UNO	3	7.5	2.25	50	22	8	9.8	20	9	42	0.1	0.4	8.4	2.8				
-SLRA4 -50-M22 UNO	4	10	3				12.3		12						35	0.2	4.2	1.7
-SLSA3.175-50-M22 UNO	3.175	6.175	1.5				8.5		9						42	0.1	8.4	4.4
E40-SLRA3 -50-M22 UNO	3	7.5	2.25	50	22	8	9.8	20	9	42	0.2	0.7	7.3	2.8				
-SLRA4 -50-M22 UNO	4	10	3				12.3		12							7.3	1.6	
-SLSA3.175-50-M22 UNO	3.175	6.175	1.5				8.5		9							7.3	4.4	
E50-SLRA3 -75-M22 UNO	3	7.5	2.25	75	22	27	9.8	25	9	65	0.5	1.7	7.1	2.8				
-SLRA4 -75-M22 UNO	4	10	3				12.3		12							7.1	1.7	
F63-SLRA3 -75-M22 UNO	3	7.5	2.25	75	22	27	9.8	25	9	54	0.7	1.8	5.4	2.8				
-SLRA4 -75-M22 UNO	4	10	3				12.3		12						58	5.4	1.7	

Holder stand

P. 12



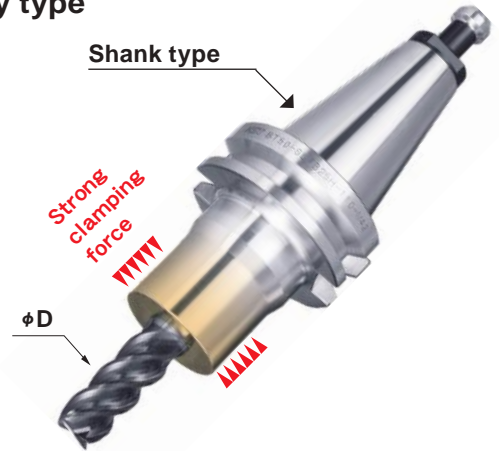
HYPER VERSION

S Short type

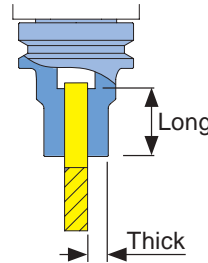
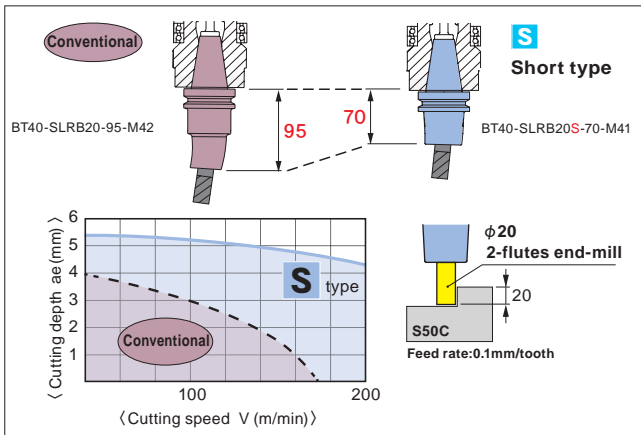


Machining efficiency 2times
(Compared to conventional holders)

H Heavy type



High gripping force 1.4 times
(Compared to conventional holders)



BT40 - SL RB 20 S - 60 - M42

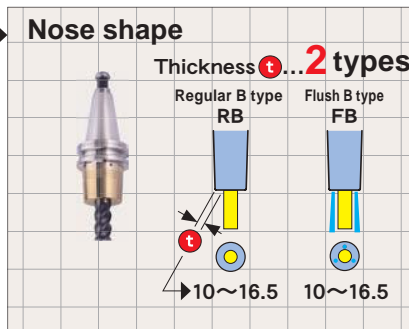
Shank type SLIMLINE φD HYPER VERSION L Effective length for machining

S Short type

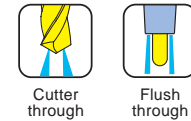
BT40
A 63

H Heavy type

BT40
BT50
A 63
A100

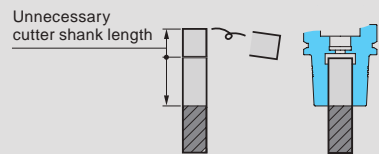


Coolant-through



About cutting tool insertion length

Since the Short type has the shortest gauge length, the cutter insertion length (h) is not deep. Cut off the unnecessary portion of the tool shank and use a cutting tool with the optimal projection. Pay special attention for HSK-A63 shank products.



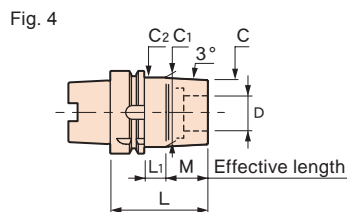
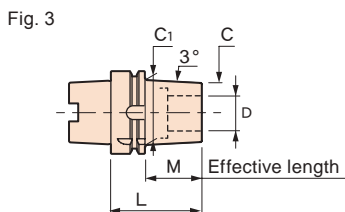
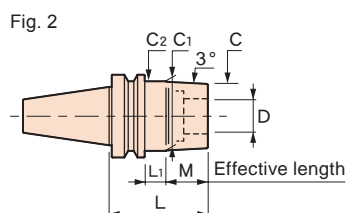
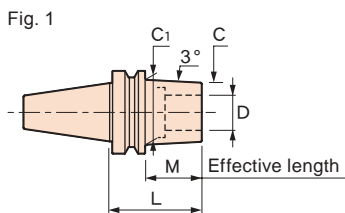
Recommended cutting tools

OSG	DIJET INDUSTRIAL	Tungaloy	MITSUBISHI MATERIALS	Mitsubishi Hitachi Tool Engineering
WX-PHSS General purpose	DV-OCSAR For difficult-to-machine materials	SEF4000 For difficult-to-machine materials	C-3SA For aluminum alloy	EPSMS-PN General purpose
UP-PHS General purpose	AL-SEESS For aluminum alloy	SEE4000-A For aluminum alloy	VF-6MHV For difficult-to-machine materials	EPPS For general steel

Feature
Shrink-fit Heater
MONO 3°
MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS
Technical data

Short type

BT40-SLRB20S-70-M41



Option

- Retention knob (BT)→P.104

Std. Access.

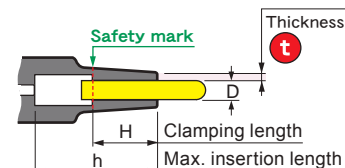
- Coolant duct (fixed type), (HSK-A)→P.106

Note

- Swing type coolant ducts are available upon request.→p.106

Caution

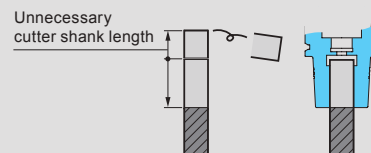
- Retention knob...Use a retention knob with hole, or remove the retention knob and heat it.(BT)
- Setting cutters...Be sure to insert the tool beyond the Safety mark.
- As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S)
- For HEAT ROBO DENJI 5000 (HRD-02S), please prepare coil No.6 (HRD2-CL6-01).
- Remove the coolant duct before heating the holder when you use hot air heater. (HSK-A)



CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	φC ₂	H	h	kg	N	G grade	S
BT40-SLRB12S-60-M28	1	12	32	10	60	28	—	35	—	27	95	1.1	1.9	3.6	0.3
-SLFB12S-60-M28		12	32	10	60	28	—	35	—	27	95	1.1	1.9	3.6	0.3
-SLRB16S-65-M33		16	38	11	65	33	—	41.5	—	30	85	1.2	2.8	4.9	—
-SLFB16S-65-M33		16	38	11	65	33	—	41.5	—	30	85	1.2	2.8	4.9	—
-SLRB20S-70-M41		20	45	12.5	70	41	—	49.4	—	36	100	1.3	4.1	6.6	0.2
-SLFB20S-70-M41		20	45	12.5	70	41	—	49.4	—	36	100	1.3	4.1	6.6	0.2
-SLRB25S-75-M30	2	25	49	12	75	30	18	52.2	53	42	—	1.4	5.4	8.1	—
-SLFB25S-75-M30		25	49	12	75	30	18	52.2	53	42	—	1.4	5.4	8.1	—
A63 -SLRB12S-60-M29	3	12	32	10	60	29	—	35.1	—	27	35	0.8	8.3	21.7	0.3
-SLFB12S-60-M29		12	32	10	60	29	—	35.1	—	27	35	0.8	8.3	21.7	0.3
-SLRB16S-65-M34		16	38	11	65	34	—	41.6	—	30	40	1	9.2	19.3	—
-SLFB16S-65-M34		16	38	11	65	34	—	41.6	—	30	40	1	9.2	19.3	—
-SLRB20S-70-M42		20	45	12.5	70	42	—	49.5	—	36	45	1.1	10.4	19.8	0.2
-SLFB20S-70-M42		20	45	12.5	70	42	—	49.5	—	36	45	1.1	10.4	19.8	0.2
-SLRB25S-75-M30	4	25	49	12	75	30	19	52.2	53	42	50	1.3	11.6	18.7	—
-SLFB25S-75-M30		25	49	12	75	30	19	52.2	53	42	50	1.3	11.6	18.7	—

About cutting tool insertion length

Since the Short type has the shortest gauge length, the cutter insertion length (h) is not deep. Cut off the unnecessary portion of the tool shank and use a cutting tool with the optimal projection. Pay special attention for HSK-A63 shank products.

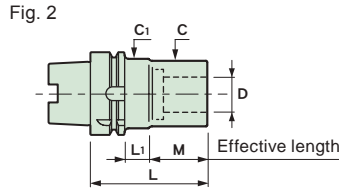
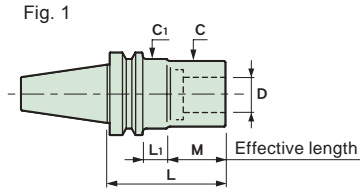
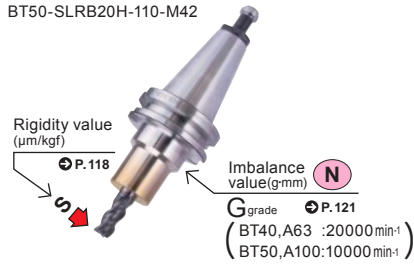


Recommended cutting tools

OSG	DIJET INDUSTRIAL	Tungaloy	MITSUBISHI MATERIALS	Mitsubishi Hitachi Tool Engineering
WX-PHSS General purpose	DV-OCSAR For difficult-to-machine materials	SEF4000 For difficult-to-machine materials	C-3SA For aluminum alloy	EPSMS-PN General purpose
UP-PHS General purpose	AL-SEESS For aluminum alloy	SEE4000-A For aluminum alloy	VF-6MHV For difficult-to-machine materials	EPPS For general steel

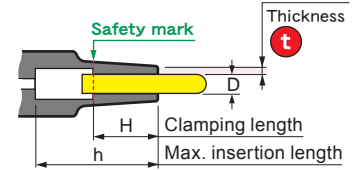
Heavy-duty type

BT50-SLRB20H-110-M42



An appropriate heating coil for HRD-02S

- **Option**
 - Retention knob (BT)→P.104
- **Std. Access.**
 - Coolant duct (fixed type), (HSK-A)→P.106
- **Note**
 - Swing type coolant ducts are available upon request.→p.106
- **Caution**
 - Retention knob...Use a retention knob with hole, or remove the retention knob and heat it.(BT)
 - Setting cutters...Be sure to insert the tool beyond the safety mark.
 - As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S)
 - For HEAT ROBO DENJI 5000 (HRD-02S), please prepare coil No.6 (HRD2-CL6-01).
 - Remove the coolant duct before heating the holder when you use hot air heater (HSK-A).
 - For HEAT ROBO Baby 3000 (HRB-03S), dia 70mm nozzle(HRB-NZL70) is required.



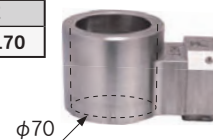
BT40, A 63:20000 min⁻¹
BT50, A100:10000 min⁻¹

CODE	Fig.	φD	φC	t	L	M	L ₁	φC ₁	H	h	Kg	N	G grade	S	Technical data		
BT40-SLRB12H- 80-M32	1	12	36	12	80	32	21	53	35	115	1.3	5.1	8.2	0.3	6		
-SLFB12H- 80-M32		12	36	12					35	115	1.4	5.1	7.6				
-SLRB16H- 80-M32		16	42	13					37	90		5.4	8.7				
-SLFB16H- 80-M32		16	42	13	37	90		5.4	8.1								
-SLRB20H- 90-M42		20	50	15	90	42			47	100	1.6	6.3	8.2			7	
-SLFB20H- 90-M42		20	50	15					47	100	1.6	6.3	8.2				
-SLRB25H- 95-M42	1	25	51	13	95		26		50	105		7	9.2				
-SLFB25H- 95-M42		25	51	13					50	105		7	9.2				
BT50-SLRB12H- 95-M32	1	12	36	12	95	32	25	53	35	150	3.8	8.8	2.4	0.3	6		
-SLFB12H- 95-M32		12	36	12					35	150	3.8	8.8	2.4				
-SLRB16H- 95-M32		16	42	13					37		3.9	9	2.4				
-SLFB16H- 95-M32		16	42	13	37		3.9	9	2.4								
-SLRB20H-110-M42		1	20	50	15	110	42	30	63	47	165	4	14.1	3.7		0.2	7
-SLFB20H-110-M42			20	50	15					47	165	4	14.1	3.7			
-SLRB25H-110-M42	1	25	58	16.5					52		4.2	14.4	3.6				
-SLFB25H-110-M42		25	58	16.5					52		4.2	14.4	3.6				
A63 -SLRB12H- 80-M32	2	12	36	12	80	32	22	53	35	55	1.1	11.3	21.5	0.3	6		
-SLFB12H- 80-M32		12	36	12					35	55	1.1	11.3	21.5				
-SLRB16H- 80-M32		16	42	13					37		1.2	11.6	20.2				
-SLFB16H- 80-M32		16	42	13	37		1.2	11.6	20.2								
-SLRB20H- 90-M42		2	20	50	15	90	42			47	65	1.5	13.1	18.3			7
-SLFB20H- 90-M42			20	50	15					47	65	1.5	13.1	18.3			
-SLRB25H- 95-M42	2	25	51	13	95		27		50	70		14.1	19.7				
-SLFB25H- 95-M42		25	51	13					50	70		14.1	19.7				

CODE	Fig.	ϕD	ϕC	t	L	M	L ₁	ϕC_1	H	h	Kg	N	G grade	S
A100-SLRB12H- 95-M32	2	12	36	12	95	32	34	53	35	63	2.7	26.9	10.5	0.3
-SLFB12H- 95-M32		12	36	12					35					
-SLRB16H- 95-M32		16	42	13					37	27.2	10.6			
-SLFB16H- 95-M32		16	42	13										
-SLRB20H-110-M42	7	20	50	15	110	42	39	63	47	78	3.2	31.3	10.3	0.2
-SLFB20H-110-M42		20	50	15					47					
-SLRB25H-110-M42		25	58	16.5					52	3.4	31.8	9.8		
-SLFB25H-110-M42		25	58	16.5									50	3.4

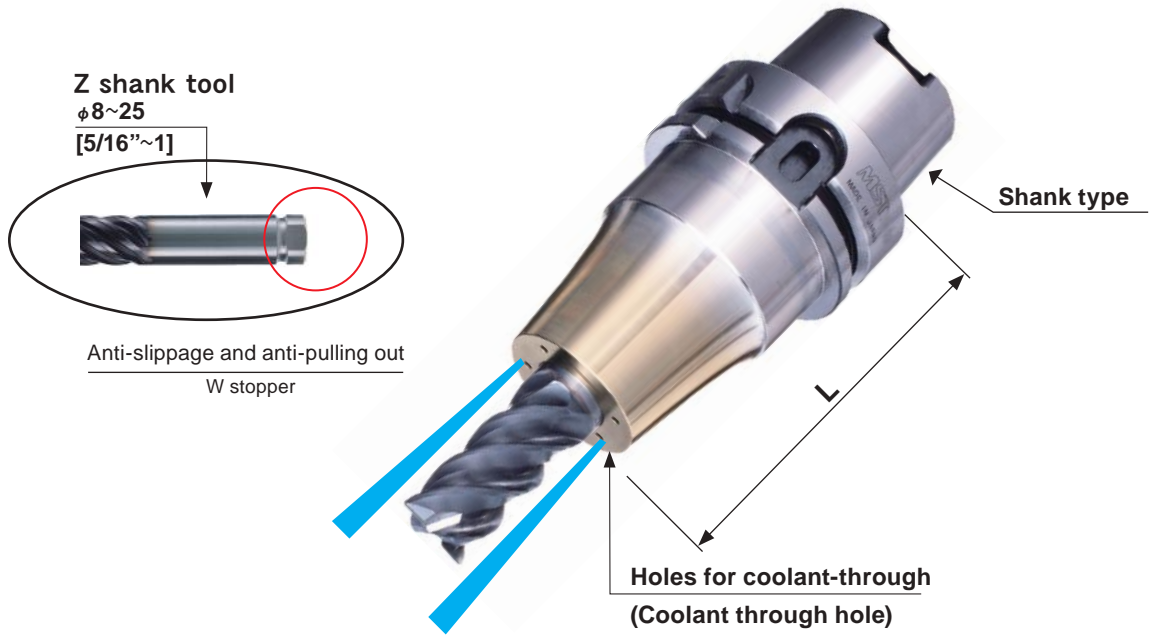
$\phi 70$ Nozzle (HRB-03S)

CODE
HRB-NZL70



■ ANTI-SLIPPAGE, SHRINK-FIT HOLDER

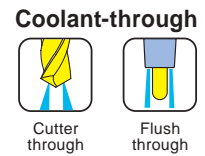
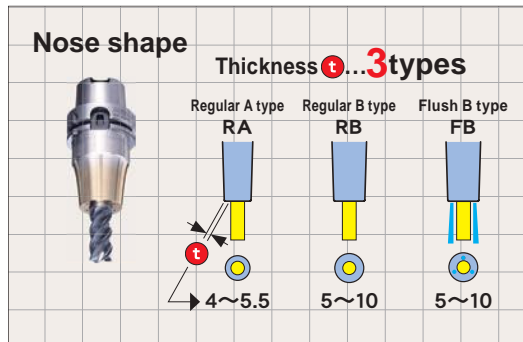
スリムライン
SLIMLINE Z



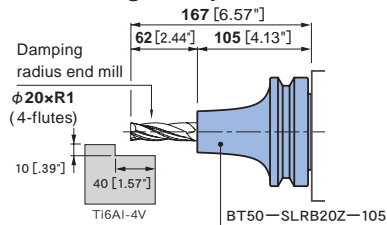
BT40 - SLRB16 Z - 90

Shank type SLIMLINE φD SLIMLINE Z L

- BT40
- BT50
- A63
- A100
- DN40
- DN50
- CT40
- CT50



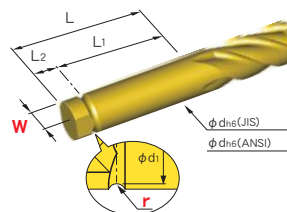
Processing examples



Rotation	2,100 min ⁻¹
Cutting speed	132 m/min
Feed	1,260 mm/min
Feed per tooth	0.15 mm/tooth

Shavings amount: 504cc/min

Z shank tool Code table



Metric

φd (h6)	W	φd1		L		L2		r
		min.	max.	min.	max.	min.	max.	
8	6.5	6.5	36	45	29	7	16	2
10	8.5	8.5	42	51	35			
12	10	10						
16	14	14	45	54	38			
20	17	17	53	62	46			
25	22	22	60	69	53			2.5

Inch

φd (h6)	W		φd1		L		L2		r
	min.	max.	min.	max.	min.	max.	min.	max.	
5/16	.25	.25	1.38	1.75	1.13	.25	.63	.08	
3/8	.32	.32	1.63	2.00	1.38				
1/2	.42	.42							
5/8	.55	.55	1.75	2.13	1.50				
3/4	.63	.63	2.00	2.38	1.75				
1"	.88	.88	2.41	2.75	2.13	.28		.1	

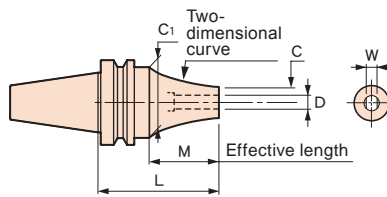
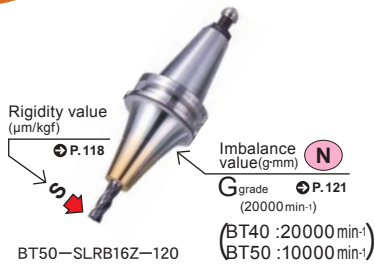
They can provide a tool for SLIMLINE Z

For Heartful Tools
株式会社 大光研磨

DIJET
MITSUBISHI
MITSUBISHI MATERIALS

三菱日立ツール
Mitsubishi Hitachi Tool

BT



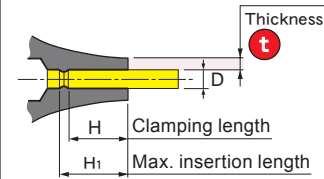
An appropriate heating coil for HRD-02S

Option









- Retention knob → P.104
- A Z-shank (dedicated) tool is needed. → P.87

Caution

- Retention knob ··· Use a retention knob with a hole, or remove the retention knob and heat it.
- Setting cutters ··· Be sure to insert the tool beyond the safety mark.
- As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S).
- Refer to the table to choose an appropriate heating coil for HEAT ROBO DENJI 5000 (HRD-02S).


 BT40 : 20000 min⁻¹
 BT50 : 10000 min⁻¹

CODE	φD	φC	t	L	M	φC1	H	H1	W	Kg	N	G grade	S	
BT40-SLRB 8Z- 90	8	18	5	90	52	53	24	29	6.5	1.2	4.6	8.0	0.6	2
-120				1.6						6.8	8.9	0.7		
-150				2						8.9	9.3	0.8		
-180				2.4						11	9.6	0.9		
-SLFB 8Z- 90	8	18	5	90	52	53	24	29	6.5	1.2	4.6	8.0	0.6	2
-120				1.6						6.8	8.9	0.7		
-150				2						8.9	9.3	0.8		
-180				2.4						11	9.6	0.9		
BT40-SLRB10Z- 90	10	22	6	90	52	53	30	35	8.5	1.3	4.8	7.7	0.5	3
-120				1.7						6.9	8.5	0.6		
-150				2						9	9.4	0.7		
-180				2.4						11.1	9.7	0.8		
-SLFB10Z- 90	10	22	6	90	52	53	30	35	8.5	1.3	4.8	7.7	0.5	3
-120				1.7						6.9	8.5	0.6		
-150				2						9	9.4	0.7		
-180				2.4						11.1	9.7	0.8		
BT40-SLRB12Z- 90	12	26	7	90	52	53	30	35	10	1.3	5	8.1	0.4	3
-120				1.7						7.1	8.7	0.5		
-150				2.1						9.2	9.2	0.6		
-180				2.5						11.3	9.5	0.8		
-SLFB12Z- 90	12	26	7	90	52	53	30	35	10	1.3	5	8.1	0.4	3
-120				1.7						7.1	8.7	0.5		
-150				2.1						9.2	9.2	0.6		
-180				2.5						11.3	9.5	0.8		
BT40-SLRB16Z- 90	16	32	8	90	52	53	32	38	14	1.4	5.3	7.9	0.4	3
-120				1.7						7.5	9.2	0.5		
-150				2.1						9.6	9.6	0.6		
-180				2.5						11.3	9.5	0.8		
-SLFB16Z- 90	16	32	8	90	52	53	32	38	14	1.4	5.3	7.9	0.4	3
-120				1.7						7.5	9.2	0.5		
-150				2.1						9.6	9.6	0.6		
-180				2.5						11.3	9.5	0.8		
BT40-SLRB20Z- 95	20	38	9	90	42	53	40	46	17	1.5	5.9	8.2	0.3	4
-120				1.9						8	8.8	0.4		
-150				2.3						10.1	9.2	0.6		
-180				2.7						12.2	9.5	0.8		
-SLFB20Z- 90	20	38	9	90	42	53	40	46	17	1.5	5.9	8.2	0.3	4
-120				1.9						8	8.8	0.4		
-150				2.3						10.1	9.2	0.6		
-180				2.7						12.2	9.5	0.8		
BT40-SLRB25Z- 95	25	45	10	95	42	53	45	53	22	1.6	6.7	8.8	0.3	4
-125				2						8.8	9.2	0.4		
-150				2.4						10.4	9.6	0.6		
-SLFB25Z- 95	25	45	10	95	42	53	45	53	22	1.6	6.7	8.8	0.3	4
-125				2						8.8	9.2	0.4		
-150				2.4						10.4	9.6	0.6		

CODE	ϕ D	ϕ C	t	L	M	ϕ C ₁	H	H ₁	W	 Kg	 N	G grade	 S	
BT50-SLRA12Z-105	12	22	5	105	67	85	30	35	10	3.9	13	3.5	0.5	2
-135				135	97					4.5	14.8	3.5	0.6	
-165				165	127					5.1	16.1	3.3	0.7	
-195				195	157					5.6	18	3.4	0.8	
-SLRB12Z-165	12	26	7	165	127	85	30	35	10	5.1	17.3	3.6	0.6	3
-195				195	157					5.4	18.9	3.7	0.7	
-SLFB12Z-165	12	26	7	165	127	85	30	35	10	5.1	17.3	3.6	0.6	3
 -195				195	157					5.4	18.9	3.7	0.7	
BT50-SLRA16Z-105	16	27	5.5	105	67	85	32	38	14	3.9	13.3	3.6	0.4	3
-135				135	97					4.3	15.4	3.8	0.5	
-165				165	127					5	17.2	3.6	0.6	
-195				195	157					5.3	18.8	3.7	0.8	
-SLRB16Z-165	16	32	8	165	127	85	32	38	14	5.1	17.5	3.6	0.5	3
-195				195	157					5.8	20.3	3.7	0.6	
-SLFB16Z-165	16	32	8	165	127	85	32	38	14	5.1	17.5	3.6	0.5	3
 -195				195	157					5.8	20.3	3.7	0.7	
BT50-SLRB20Z-105	20	38	9	105	67	85	40	46	17	4.1	13.8	3.5	0.3	4
-135				135	97					4.8	17.2	3.8		
-165				165	127					5.5	20.7	4	0.4	
-SLFB20Z-105	20	38	9	105	67	85	40	46	17	4.1	13.8	3.5	0.3	4
 -135				135	97					4.8	17.2	3.8		
-165				165	127					5.5	20.7	4	0.4	
BT50-SLRB25Z-110	25	45	10	110	72	85	45	53	22	4.3	15	3.7	0.3	4
-140				140	102					4.8	17.7	3.9		
-SLFB25Z-110	25	45	10	110	72	85	45	53	22	4.3	15	3.7	0.3	4
 -140				140	102					4.8	17.7	3.9		



Feature

Shrink-fit Heater

MONO 3°
MONO CURVE

MONO Series

2PIECE type

UNO

HYPER
VERSION

Z

STRAIGHT
arbor

OTHERS

PERIPHERALS

Technical
data

HSK-A

A63-SLRB16Z-120

Rigidity value
($\mu\text{m/kgf}$)
P.118

Imbalance
value(g \cdot mm) **N**
G_{grade} P.121
(A 63 :20000 min⁻¹)
(A100 :10000 min⁻¹)

Fig. 1

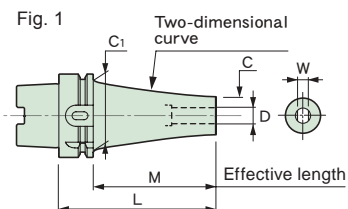
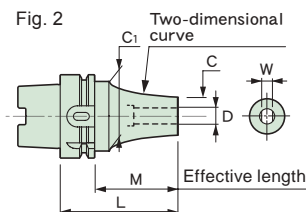


Fig. 2



An appropriate heating coil
for HRD-02S

■Std.Access.

- Coolant duct (fixed type)→P.<106>

■Option

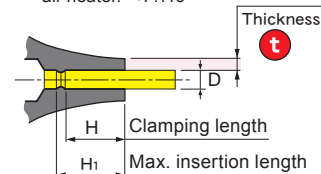
- A Z-shank (dedicated) tool is needed.→P.87

■Note

- As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S).
- Refer to the table to choose an appropriate heating coil for HEAT ROBO DENJI 5000 (HRD-02S).
- Swing type coolant ducts are available upon request.









■Caution












- Remove the coolant duct before heating the holder when you use hot air heater. →P.116



A 63:20000 min⁻¹
A100:10000 min⁻¹

CODE	Fig.	ϕ D	ϕ C	t	L	M	ϕ C ₁	H	H ₁	W	Kg lbs	N	G grade	S
A63-SLRA8Z- 90	1	8	16	4	90	64	53	24	29	6.5	1	8.4	17.6	0.7
-120					120	94					1.2	9.6	16.8	1
-150					150	124					1.4	10.8	16.2	1.4
-SLRB8Z- 90	2	8	18	5	90	52	53	24	29	6.5	1.1	10.9	20.8	0.6
-120					120	1.4					14.1	21.1	0.8	
-150					150	1.8					17.2	20		
-180					180	2.2					20.4	19.4	0.9	
-SLFB8Z- 90	2	8	18	5	90	52	53	24	29	6.5	1.1	10.9	20.8	0.6
-120					120	1.4					14.1	21.1	0.7	
-150					150	1.8					17.2	20		
-180					180	2.2					20.4	19.4	0.9	
A63-SLRA5/16Z- 90	1	5/16	.63	.16	3.54	2.52	2.09	.94	1.13	.25	2.2	8.4	17.6	0.7
-120					4.72	3.70					2.6	9.6	17	1
-150					5.91	4.88					3.1	10.8	16.1	1.4
-SLRB5/16Z- 90	2	5/16	.71	.20	3.54	2.05	2.09	.94	1.13	.25	2.4	10.9	21	0.6
-120					4.72	3.1					14.1	21	0.7	
-150					5.91	4					17.2	19.9		
-180					7.09	4.9					20.4	19.2	0.9	
-SLFB5/16Z- 90	2	5/16	.71	.20	3.54	2.05	2.09	.94	1.13	.25	2.4	10.9	21	0.6
-120					4.72	3.1					14.1	21	0.7	
-150					5.91	4					17.2	19.9		
-180					7.09	4.9					20.4	19.2	0.9	
A63-SLRA10Z- 90	1	10	19	4.5	90	64	53	30	35	8.5	1	8.5	17.8	0.6
-120					120	94					1.2	9.6	16.8	0.9
-150					150	124					1.3	10.9	17.6	1.4
-SLRB10Z- 90	2	10	22	6	90	52	53	30	35	8.5	1.1	11.1	21.1	0.5
-120					120	1.5					14.3	20	0.7	
-150					150	1.6					17.4	22.8		
-180					180	2.3					20.6	18.8	0.8	
-SLFB10Z- 90	2	10	22	6	90	52	53	30	35	8.5	1.1	11.1	21.1	0.5
-120					120	1.5					14.3	20	0.6	
-150					150	1.6					17.4	22.8		
-180					180	2.3					20.6	18.8	0.8	
A63-SLRA3/8Z- 90	1	3/8	.73	.18	3.54	2.52	2.09	1.18	1.38	.31	2.2	8.5	17.8	0.6
-120					4.72	3.70					2.6	9.6	17	0.9
-150					5.91	4.88					2.9	10.9	17.4	1.4
-SLRB3/8Z- 90	2	3/8	.85	.24	3.54	2.05	2.09	1.18	1.38	.31	2.4	11.1	21.4	0.5
-120					4.72	3.3					14.3	20	0.6	
-150					5.91	3.5					17.4	23		
-180					7.09	5.1					20.6	18.6	0.8	

CODE	Fig.	φD	φC	t	L	M	φC1	H	H1	W	Kg lbs	N	G grade	S	Feature
A63-SLFB3/8Z- 90	2	3/8	.85	.24	3.54	2.05	2.09	1.18	1.38	.31	2.4	11.1	21.4	0.5	3
 -120					4.72						3.3	14.3	20	0.6	
-150					5.91						3.5	17.4	23		
-180					7.09						5.1	20.6	18.6	0.8	
A63-SLRA12Z- 90	1	12	22	5	90	64	53	30	35	10	1	8.5	17.8	0.6	2
-120					120	94					1.3	10.4	16.8	0.7	
-150					150	124					1.5	11.7	16.3	1.1	
-SLRB12Z- 90	2	12	26	7	90	52	53	30	35	10	1.1	11.4	21.7	0.4	3
-120					120						1.5	14.6	20.4	0.5	
-150					150						1.6	17.7	23.2	0.6	
-180					180						2.3	20.9	19	0.7	
-SLFB12Z- 90	2	12	26	7	90	52	53	30	35	10	1.1	11.4	21.7	0.4	3
 -120					120						1.5	14.6	20.4	0.5	
-150					150						1.6	17.7	23.2	0.6	
-180					180						2.3	20.9	19	0.7	
A63-SLRA1/2Z- 90	1	1/2	.89	.20	3.54	2.52	2.09	1.18	1.38	.42	2.2	8.5	17.8	0.6	2
-120					4.72	3.70					2.9	10.4	16.6	0.7	
-150					5.91	4.88					3.3	11.7	16.4	1.1	
-SLRB1/2Z- 90	2	1/2	1.05	.28	3.54	2.05	2.09	1.18	1.38	.42	2.4	11.4	21.9	0.4	3
-120					4.72						3.3	14.6	20.4	0.5	
-150					5.91						3.5	17.7	23.3	0.6	
-180					7.09						5.1	20.9	18.9	0.7	
-SLFB 1/2Z- 90	2	1/2	1.05	.28	3.54	2.05	2.09	1.18	1.38	.42	2.4	11.4	21.9	0.4	3
 -120					4.72						3.3	14.6	20.4	0.5	
-150					5.91						3.5	17.7	23.3	0.6	
-180					7.09						5.1	20.9	18.9	0.7	
A63-SLRA16Z- 90	2	16	27	5.5	90	52	53	32	38	14	1.1	11.6	22.1	0.4	3
-120	1				120	94					1.3	12.9	20.8	0.7	
-SLRB16Z- 90	2	16	32	8	90	52	53	32	38	14	1.2	12	20.9	0.4	3
-120					120						1.6	15.1	19.8		
-150					150						2	18.3	19.2	0.6	
-SLFB16Z- 90	2	16	32	8	90	52	53	32	38	14	1.2	12	20.9	0.4	3
 -120					120						1.6	15.1	19.8		
-150					150						2	18.3	19.2	0.6	
A63-SLRA5/8Z- 90	2	5/8	1.06	.22	3.54	2.05	2.09	1.26	1.5	.55	2.4	11.6	22.3	0.4	3
-120	1				4.72	3.70					2.9	12.9	20.5	0.7	
-SLRB5/8Z- 90	2	5/8	1.25	.31	3.54	2.05	2.09	1.26	1.5	.55	2.6	12.0	21.3	0.4	3
-120					4.72						3.5	15.1	19.9		
-150					5.91						4.4	18.3	19.2	0.6	
-SLFB5/8Z- 90	2	5/8	1.25	.31	3.54	2.05	2.09	1.26	1.5	.55	2.6	12.0	21.3	0.4	3
 -120					4.72						3.5	15.1	19.9		
-150					5.91						4.4	18.3	19.2	0.6	
A63-SLRB20Z- 90	2	20	38	9	90	42	53	40	46	17	1.3	12.7	20.5	0.3	4
-120					120						1.4	15.9	23.8	0.4	
-150					150						2.1	19.1	19	0.5	
-SLFB20Z- 90	2	20	38	9	90	42	53	40	46	17	1.3	12.7	20.5	0.3	4
 -120					120						1.4	15.9	23.8	0.4	
-150					150						2.1	19.1	19	0.5	
A63-SLRB3/4Z- 90	2	3/4	1.46	.35	3.54	1.65	2.09	1.5	1.75	.63	2.9	12.7	20.2	0.3	4
-120					4.72						3.1	15.9	23.7	0.4	
-150					5.91						4.6	19.1	19.2	0.5	
-SLFB3/4Z- 90	2	3/4	1.46	.35	3.54	1.65	2.09	1.5	1.75	.63	2.9	12.7	20.2	0.3	4
 -120					4.72						3.1	15.9	23.7	0.4	
-150					5.91						4.6	19.1	19.2	0.5	
A63-SLRB25Z- 95	2	25	45	10	95	42	53	45	53	22	1.4	13.9	20.8	0.3	4
-125					125						1.8	17.1	19.9	0.4	
-SLFB25Z- 95	2	25	45	10	95	42	53	45	53	22	1.4	13.9	20.8	0.3	4
 -125					125						1.8	17.1	19.9	0.4	

CODE	Fig.	φD	φC	t	L	M	φC1	H	H1	W			G grade		
A 63 -SLRB1Z- 95	2	1"	1.79	.39	3.74	1.65	2.09	1.77	2.09	.88	3.1	13.9	20.7	0.3	4
-125					4.92						4	17.1	19.7	0.4	
-SLFB1Z- 95	2	1"	1.79	.39	3.74	1.65	2.09	1.77	2.09	.88	3.1	13.9	20.7	0.3	4
 -125					4.92						4	17.1	19.7	0.4	
A100-SLRA12Z-105	1	12	22	5	105	76	85	30	35	10	3	27.7	9.7	0.4	3
-135					135	106					3.3	29.9	9.5	0.6	
-165					165	136					3.7	31.3	8.9	0.8	2
-195					195	166					4.5	35.6	8.3		
-SLRB12Z-165	1	12	26	7	165	136	85	30	35	10	4	34.3	9	0.6	3
-195					195	166					4.8	39.2	8.6		
-SLFB12Z-165	1	12	26	7	165	136	85	30	35	10	4	34.3	9	0.6	3
 -195					195	166					4.8	39.2	8.6	0.7	
A100-SLRA1/2Z-105	1	1/2	.89	.20	4.13	2.99	3.35	1.18	1.38	.42	6.6	27.7	9.7	0.4	3
-135					5.31	4.17					7.3	29.9	9.5	0.5	
-165					6.50	5.35					8.2	31.3	8.8	0.8	2
-195					7.68	6.54					9.9	35.6	8.3		
-SLRB1/2Z-165	1	1/2	1.05	.28	6.50	5.35	3.35	1.18	1.38	.42	8.8	34.3	9	0.6	3
-195					7.68	6.54					10.6	39.2	8.5	0.7	
-SLFB1/2Z-165	1	1/2	1.05	.28	6.50	5.35	3.35	1.18	1.38	.42	8.8	34.3	9	0.6	3
 -195					7.68	6.54					10.6	39.2	8.5	0.7	
A100-SLRA16Z-105	1	16	27	5.5	105	76	85	32	38	14	3	28.1	9.8	0.4	3
-135					135	106					3.4	30.5	9.4	0.5	
-165					165	136					4	34.2	9	0.6	2
-195					195	166					4.3	36.6	8.9	0.8	
-SLRB16Z-165	1	16	32	8	165	136	85	32	38	14	4	34.4	9	0.5	3
-195					195	166					4.5	37.6	8.8	0.6	
-SLFB16Z-165	1	16	32	8	165	136	85	32	38	14	4	34.4	9	0.5	3
 -195					195	166					4.5	37.6	8.8	0.7	
A100-SLRA5/8Z-105	1	5/8	1.06	.22	4.13	2.99	3.35	1.26	1.50	.55	6.6	28.1	9.8	0.4	3
-135					5.31	4.17					7.5	30.5	9.4	0.5	
-165					6.50	5.35					8.8	34.2	9	0.6	2
-195					7.68	6.54					9.5	36.6	8.9		
-SLRB5/8Z-165	1	5/8	1.25	.31	6.50	5.35	3.35	1.26	1.50	.55	8.8	34.4	9	0.5	3
-195					7.68	6.54					9.9	37.6	8.8	0.7	
-SLFB5/8Z-165	1	5/8	1.25	.31	6.50	5.35	3.35	1.26	1.50	.55	8.8	34.4	9	0.5	3
 -195					7.68	6.54					9.9	37.6	8.8	0.7	
A100-SLRB20Z-105	1	20	38	9	105	76	85	40	46	17	3.1	28.7	9.7	0.3	4
-135					135	106					3.8	33.4	9.2		
-165					165	136					4.6	38.9	8.9	0.6	2
-SLFB20Z-105	1	20	38	9	105	76	85	40	46	17	3.1	28.7	9.7	0.3	
-135					135	106					3.8	33.4	9.2		
-165					165	136					4.6	38.9	8.9	0.4	2
A100-SLRB3/4Z-105	1	3/4	1.46	.35	4.13	2.99	3.35	1.50	1.75	.63	6.8	28.7	9.7	0.3	
-135					5.31	4.17					8.4	33.4	9.2		
-165					6.50	5.35					10.1	38.9	8.9	0.4	2
-SLFB3/4Z-105	1	3/4	1.46	.35	4.13	2.99	3.35	1.50	1.75	.63	6.8	28.7	9.7	0.3	
-135					5.31	4.17					8.4	33.4	9.2		
-165					6.50	5.35					10.1	38.9	8.9	0.4	2
A100-SLRB25Z-110	1	25	45	10	110	81	85	45	53	22	3.1	29.7	10.1	0.3	
-140					140	111					3.8	34.4	9.5		
-SLFB25Z-110	1	25	45	10	110	81	85	45	53	22	3.1	29.7	10.1	0.3	4
 -140					140	111					3.8	34.4	9.5		
A100-SLRB 1Z-110	1	1"	1.79	.39	4.33	3.19	3.35	1.77	2.13	.88	6.8	29.7	10.1	0.3	4
-140					5.51	4.37					8.4	34.4	9.5		
-SLFB 1Z-110	1	1"	1.79	.39	4.33	3.19	3.35	1.77	2.13	.88	6.8	29.7	10.1	0.3	4
 -140					5.51	4.37					8.4	34.4	9.5		

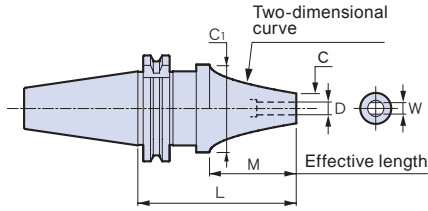
DN40

DN40AD-SLRB16Z-90

Rigidity value
($\mu\text{m/kgf}$)

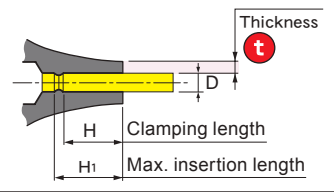
⊕ P.118

Imbalance value(gmm) **N**
G grade ⊕ P.121
(20000min⁻¹)



An appropriate heating coil for HRD-02S

- Option**
- Retention knob → P.104
 - A Z-shank (dedicated) tool is needed. → P.87
- Caution**
- Retention knob ··· Use a retention knob with a hole, or remove the retention knob and heat it.
 - Setting cutters ··· Be sure to insert the tool beyond the safety mark.
 - As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S).
 - Refer to the table to choose an appropriate heating coil for HEAT ROBO DENJI 5000 (HRD-02S).



20000 min⁻¹

CODE	ϕD	ϕC	t	L	M	$\phi C1$	H	H1	W	Kg	N	G grade	S	
DN40AD-SLRB 8Z- 90	8	18	5	90	52	50	24	29	6.5	1.1	7.8	14.9	0.6	2
				120		53				1.5	10.9	15.2	0.7	
				150						1.9	14.1	15.5	0.8	
				180						2.3	17.3	15.8	0.9	
-SLFB 8Z- 90	8	18	5	90	52	50	24	29	6.5	1.1	7.8	14.9	0.6	2
				120		53				1.5	10.9	15.2	0.7	
				150						1.9	14.1	15.5	0.8	
				180						2.3	17.3	15.8	0.9	
DN40AD-SLRB10Z- 90	10	22	6	90	52	50	30	35	8.5	1.2	8	14	0.5	3
				120		53				1.6	11.2	14.7	0.6	
				150						2	14.3	15	0.7	
				180						2.3	17.5	15.9	0.9	
-SLFB10Z- 90	10	22	6	90	52	50	30	35	8.5	1.2	8	14	0.5	3
				120		53				1.6	11.2	14.7	0.6	
				150						2	14.3	15	0.7	
				180						2.3	17.5	15.9	0.8	
DN40AD-SLRB12Z- 90	12	26	7	90	52	50	30	35	10	1.2	8.3	14.5	0.5	3
				120		53				1.6	11.5	15.1	0.5	
				150						2	14.6	15.3	0.6	
				180						2.4	17.8	15.5	0.8	
-SLFB12Z- 90	12	26	7	90	52	50	30	35	10	1.2	8.3	14.5	0.4	3
				120		53				1.6	11.5	15.1	0.5	
				150						2	14.6	15.3	0.6	
				180						2.4	17.8	15.5	0.8	
DN40AD-SLRB16Z- 90	16	32	8	90	52	50	32	38	14	1.3	8.8	14.2	0.4	3
				120		53				1.7	12	14.8	0.5	
				150						2.1	15.2	15.2	0.6	
-SLFB16Z- 90	16	32	8	90	52	50	32	38	14	1.3	8.8	14.2	0.4	3
				120		53				1.7	12	14.8	0.5	
				150						2.1	15.2	15.2	0.6	
DN40AD-SLRB20Z- 90	20	38	9	90	42	50	40	46	17	1.4	9.6	14.4	0.3	4
				120		53				1.8	12.8	14.9	0.4	
				150						2.2	16	15.2	0.6	
-SLFB20Z- 90	20	38	9	90	42	50	40	46	17	1.4	9.6	14.4	0.3	4
				120		53				1.8	12.8	14.9	0.4	
				150						2.2	16	15.2	0.6	

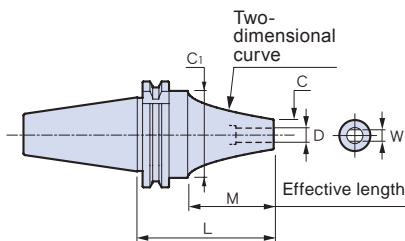
Feature
Shrink-fit Heater
MONO 3°
MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS
Technical data

DN50

DN50AD-SLRB20Z-135

Rigidity value
($\mu\text{m/kgf}$)
P.118

Imbalance
value(gmm) **N**
G grade P.121
(10000 min⁻¹)



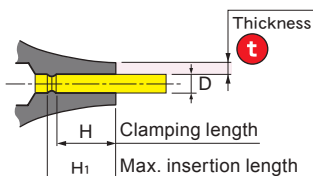
An appropriate heating coil
for HRD-02S

Option

- Retention knob → P.104
- A Z-shank (dedicated) tool is needed. → P.87

Caution

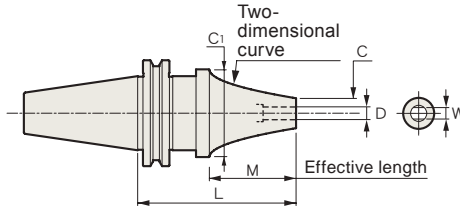
- Retention knob: Use a retention knob with a hole, or remove the retention knob and heat it.
- Setting cutters: Be sure to insert the tool beyond the safety mark.
- As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S).
- Refer to the table to choose an appropriate heating coil for HEAT ROBO DENJI 5000 (HRD-02S).



CODE	ϕD	ϕC	t	L	M	ϕC_1	H	H ₁	W	Kg	N	G grade	S	
DN50AD-SLRA12Z-105	12	22	5	105	70	70	30	35	10	3.5	16.7	11	0.4	3
-135				135	100									
-165				165	130									
-195				195	160									
-SLRB12Z-165	12	26	7	165	130	70	30	35	10	4.5	22.1	11.3	0.6	3
-195				195	160									
-SLFB12Z-165	12	26	7	165	130	70	30	35	10	4.5	22.1	11.3	0.6	3
-195				195	160									
DN50AD-SLRA16Z-105	16	27	5.5	105	70	70	32	38	14	3.5	17	11.2	0.4	4
-135				135	100									
-165				165	130									
-195				195	160									
-SLRB16Z-165	16	32	8	165	130	70	32	38	14	4.4	21.8	11.4	0.6	3
-195				195	160									
-SLFB16Z-165	16	32	8	165	130	70	32	38	14	4.4	21.8	11.4	0.6	3
-195				195	160									
DN50AD-SLRB20Z-105	20	38	9	105	70	70	40	46	17	3.6	17.6	11.3	0.3	4
-135				135	100									
-165				165	130									
-SLFB20Z-105	20	38	9	105	70	70	40	46	17	3.6	17.6	11.3	0.3	4
-135				135	100									
-165				165	130									
DN50AD-SLRB25Z-110	25	45	10	110	75	70	45	53	22	3.7	18.8	11.7	0.3	4
-140				140	90									
-SLFB25Z-110	25	45	10	110	75	70	45	53	22	3.7	18.8	11.7	0.3	4
-140				140	90									

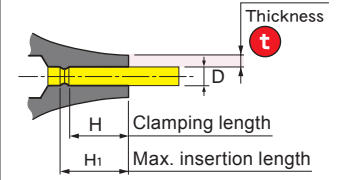
CT40

CT40-SLRB5/8Z-90



An appropriate heating coil for HRD-02S

- Option**
- Retention knob → P.104
 - A Z-shank (dedicated) tool is needed. → P.87
- Caution**
- Retention knob: Use a retention knob with a hole, or remove the retention knob and heat it.
 - Setting cutters: Be sure to insert the tool beyond the safety mark.
 - As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S).
 - Refer to the table to choose an appropriate heating coil for HEAT ROBO DENJI 5000 (HRD-02S).



20000min⁻¹

CODE	φD	φC	t	L	M	φC ₁	H	H ₁	W	lbs	N	G grade	S	
CT40-SLRB5/16Z- 95	5/16	.71	.20	3.74	2.05	2.09	.94	1.13	.25	2.6	7.6	13.5	0.7	2
-120				4.72						3.3	10.2	14.3		
-150				5.91						4.2	13.4	14.7	0.8	
-180				7.09						5.1	16.6	15	1	
-SLFB5/16Z- 95	5/16	.71	.20	3.74	2.05	2.09	.94	1.13	.25	2.6	7.6	13.5	0.7	2
-120				4.72						3.3	10.2	14.3		
-150				5.91						4.2	13.4	14.7	0.8	
-180				7.09						5.1	16.6	15	1	
CT40-SLRB 3/8Z- 95	3/8	.85	.24	3.74	2.05	2.09	1.18	1.38	.31	2.6	7.7	13.7	0.6	3
-120				4.72						3.3	10.5	14.7		
-150				5.91						4.2	13.6	15	0.8	
-180				7.09						5.1	16.8	15.2	0.9	
-SLFB 3/8Z- 95	3/8	.85	.24	3.74	2.05	2.09	1.18	1.38	.31	2.6	7.7	13.7	0.6	3
-120				4.72						3.3	10.5	14.7		
-150				5.91						4.2	13.6	15	0.8	
-180				7.09						5.1	16.8	15.2	0.9	
CT40-SLRB 1/2Z- 95	1/2	1.05	.28	3.74	2.05	2.09	1.18	1.38	.42	2.9	8.1	12.9	0.5	3
-120				4.72						3.5	10.8	14.2	0.6	
-150				5.91						4.4	14	14.7	0.7	
-180				7.09						5.3	17.1	14.9	0.9	
-SLFB 1/2Z- 95	1/2	1.05	.28	3.74	2.05	2.09	1.18	1.38	.42	2.9	8.1	12.9	0.5	3
-120				4.72						3.5	10.8	14.2	0.6	
-150				5.91						4.4	14	14.7	0.7	
-180				7.09						5.3	17.1	14.9	0.9	
CT40-SLRB 5/8Z- 95	5/8	1.25	.31	3.74	2.05	2.09	1.26	1.5	.55	2.9	8.6	13.7	0.4	3
-120				4.72						3.5	11.3	14.9	0.5	
-150				5.91						4.4	14.5	15.2	0.7	
-SLFB 5/8Z- 95				5/8						1.25	.31	3.74	2.05	
-120	4.72	3.5	11.3		14.9	0.5								
-150	5.91	4.4	14.5		15.2	0.7								
CT40-SLRB 3/4Z- 95	3/4	1.46	.35		3.74	1.65	2.09	1.5	1.75			.63		3.3
-120				4.72	4					12	13.9		0.5	
-150				5.91	4.9					15.1	14.2		0.7	
-SLFB 3/4Z- 95				3/4	1.46					.35	3.74		1.65	2.09
-120	4.72	4	12			13.9	0.5							
-150	5.91	4.9	15.1			14.2	0.7							

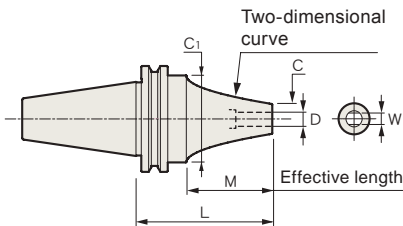
Feature
Shrink-fit Heater
MONO 3°
MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS
Technical data

CT50

CT50-SLRB3/4Z-135

Rigidity value
($\mu\text{m/kgf}$)
P.118

Imbalance
value(gmm) **N**
G grade P.121
(10000min⁻¹)



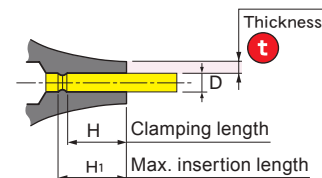
An appropriate heating coil
for HRD-02S

Option

- Retention knob → P.104
- A Z-shank (dedicated) tool is needed. → P.87

Caution

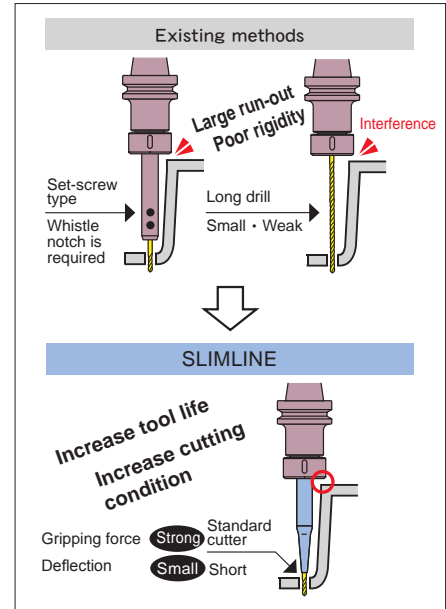
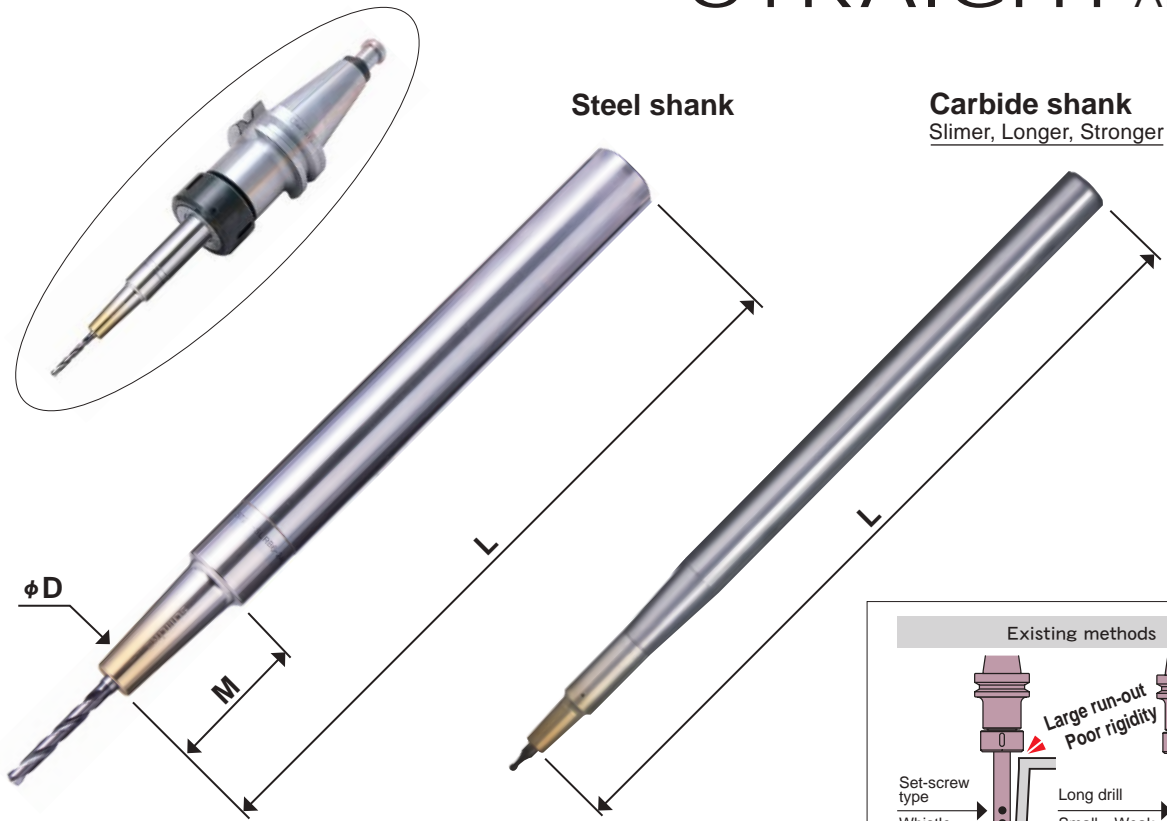
- Retention knob ··· Use a retention knob with a hole, or remove the retention knob and heat it.
- Setting cutters ··· Be sure to insert the tool beyond the safety mark.
- As for MST SLIMLINE, please use HEAT ROBO DENJI 5000S (HRD-02S) or HEAT ROBO Baby 3000S (HRB-03S).
- Refer to the table to choose an appropriate heating coil for HEAT ROBO DENJI 5000 (HRD-02S).



10000min⁻¹

CODE	ϕD	ϕC	t	L	M	ϕC_1	H	H ₁	W	lbs	N	G grade	S
CT50-SLRA1/2Z-105	1/2	.89	.20	4.13	2.76	2.76	1.18	1.38	.42	7.7	16.3	4.9	0.4
				5.31	3.94					8.6	18	4.8	0.6
				6.50	5.12					9.5	18.9	4.6	0.8
				7.68	6.30					10.6	22.1	4.8	
-SLRB1/2Z-165	1/2	1.05	.28	6.50	5.12	2.76	1.18	1.38	.42	9.9	21.7	5.1	0.6
				7.68	6.30					10.6	24	5.2	0.8
-195	1/2	1.05	.28	6.50	5.12	2.76	1.18	1.38	.42	9.9	21.7	5.1	0.6
				7.68	6.30					10.6	24	5.2	0.8
CT50-SLRA5/8Z-105	5/8	1.06	.22	4.13	2.76	2.76	1.26	1.50	.55	7.7	16.6	5	0.4
				5.31	3.94					7.9	18.1	5.3	0.5
				6.50	5.12					9.7	21.7	5.2	0.7
				7.68	6.30					10.4	24	5.3	0.8
-SLRB5/8Z-165	5/8	1.25	.31	6.50	5.12	2.76	1.26	1.50	.55	9.7	21.4	5.1	0.6
				7.68	6.30					10.8	25.1	5.4	0.7
-195	5/8	1.25	.31	6.50	5.12	2.76	1.26	1.50	.55	9.7	21.4	5.1	0.6
				7.68	6.30					10.8	25.1	5.4	0.7
CT50-SLRB3/4Z-105	3/4	1.46	.35	4.13	2.76	2.76	1.50	1.75	.63	7.9	17.2	5	0.3
				5.31	3.94					8.8	20.5	5.4	0.4
				6.50	5.12					10.4	24.9	5.5	0.5
				4.13	2.76					7.9	17.2	5	0.3
-SLFB3/4Z-105	3/4	1.46	.35	4.13	2.76	2.76	1.50	1.75	.63	7.9	17.2	5	0.3
				5.31	3.94					8.8	20.5	5.4	0.4
-165	3/4	1.46	.35	6.50	5.12	2.76	1.50	1.75	.63	10.4	24.9	5.5	0.5
				4.13	2.95					8.2	18.4	5.2	0.3
CT50-SLRB 1Z-110	1"	1.79	.39	4.33	2.95	2.76	1.77	2.13	.88	8.2	18.4	5.2	0.3
				5.51	3.94					9.5	22.7	5.5	0.4
-140	1"	1.79	.39	4.33	2.95	2.76	1.77	2.13	.88	8.2	18.4	5.2	0.3
				5.51	3.94					9.5	22.7	5.5	0.4

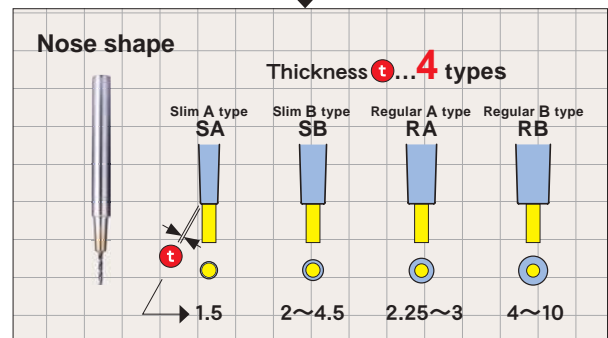
STRAIGHT ARBOR



ST 10 C - SL SA 3 - 110 - M42

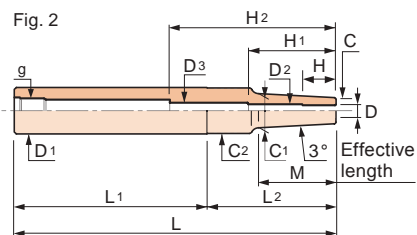
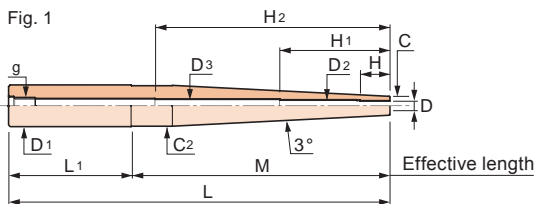
Carbide shank SLIMLINE φD L Effective length

METRIC	INCH
10	19.05
12	25.4
16	
20	
25	
32	
42	



Standard type

ST25-SLSA10-255

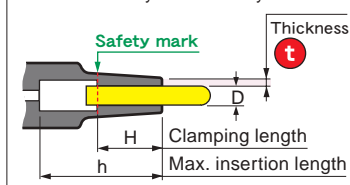


Compatibility table
for HRD-01S



[○] Available [—] Not available
[▲] Usable by raising the heating unit. →P.117

Caution


- Setting cutters ··· Be sure to insert the tool beyond the safety mark.

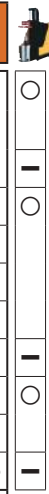


CODE	Fig.	φD	φC	t	L	M	D1	H	L1	L2	φC1	φC2	g	h	Kg lbs	φD2	φD3	H1	H2	
ST10-SLSA3- 80-M 35	1	3	6	1.5	80	35	10	9	45	—	—	9.3	M 6	64	0.03	4	—	49.6	—	○
ST16-SLRA3- 90-M 22	2		7.5	2.25	90	22	16		60	30	9.8	15.5	M10	62	0.09			33.7		○
-SLSA3-115-M 42			6	1.5	115	42				55	10.4			87	0.1			53.7		○
-SLRA3-115-M 42			7.5	2.25					65	50	11.9									○
-SLSA3-140-M 67			6	1.5	140	67			60	80	13			112		6	54.4	84.3		○
-SLRA3-140-M 67			7.5	2.25					65	75	14.5									○
ST20-SLRA3-175-M 97					175	97	20		70	105	17.7	19.5		147				53.4	109.3	○
-SLSA3-200-M 97			6	1.5	200				90	110	16.2			172	0.3			54.4	104.3	○
ST25-SLSA3-245-M 97					245		25		120	125		24.5		217	0.6		5	49.7	105.3	○
-SLRA3-245-M 97			7.5	2.25							17.7							47.5	99.5	○
-SLSA3-315-M195	1		6	1.5	315	195				—	—			287				49.7	112.1	○
-SLRA3-315-M 67	2		7.5	2.25		67			220	95	14.5				0.9				75.3	○
ST10-SLSA3.175-80-M35	1	3.175	6.175	1.5	80	035	10	10	45	—	—	9.3	M 6	64	0.03	4	—	49.6	—	○
ST19.05-SLS1/8-200	2	1/8	.24	.059	7.87	3.82	.750	.38	3.54	4.33	.64	.728	M10	7.20	0.62	.16	.24	2.16	4.13	○
ST10-SLSA4- 80-M 35	1	4	7	1.5	80	35	10	12	45	—	—	9.5	M 6	64	0.03	5	—	50	—	○
ST16-SLRA4- 90-M 22	2		10	3	90	22	16		60	30	12.3	15.5	M10	62	0.09			34		○
-SLSA4-115-M 42			7	1.5	115	42				55	11.4			87	0.1			64		○
-SLRA4-115-M 42			10	3					65	50	14.4							54		○
-140-M 60	1				140	60			80	—	—			112				64		○
ST16-SLSA4-140-M 67	2		7	1.5		67			60	80	14					6	64.7	84.3		○
ST20-SLRA4-175-M 95	1		10	3	175	95	20		80	—	—	19.5		147	0.3			53.7	99.3	○
-SLSA4-200-M 97	2		7	1.5	200	97			90	110	17.2			172		7	39.4	104.5		○
ST25-SLSA4-245-M 97					245		25		120	125		24.5		217	0.6		6	49.7	105.6	○
-SLRA4-245-M 97			10	3							20.2							50.5	100.5	○
-315-M 67					315	67			220	95	17			287	0.9				70.5	○
-SLSA4-315-M195	1		7	1.5		195			120	—	—				0.7			49.7	112.4	○
ST19.05-SLS3/16-200	1	3/16	.31	.059	7.87	4.33	.750	.59	3.54			.728	M10	7.20	0.55	.24	—	2.76	—	○
ST10-SLSA5- 80-M 35		5	8	1.5	80	35	10	15	45			9.5	M 6	70	0.03	—		—		○
ST20-SLSA5-200-M110					200	110	20		90			19.2	M10	182	0.3	6		69.3		○
ST25-SLSA5-290-M 97	2				290	97	25		180	110	18.2	24.5		272	0.8		7	69.7	114.5	○

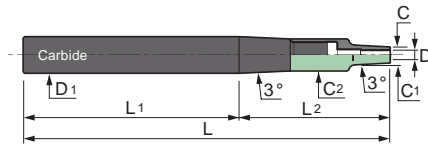
CODE	Fig.	φD	φC	t	L	M	D1	H	L1	L2	φC1	φC2	g	h		φD2	φD3	H1	H2								
ST12-SLSA6- 80-M 35	1	6	9	1.5	80	35	12	18	45	—	—	11.5	M 8	52	0.04	—	—	—	—	○							
ST12-SLSA6-180-M 35	2				115	42	16		60	55	13.4	15.5	M10	87	0.1	7			84.5		○						
ST16-SLSB6-115-M 42			10	2						65	50	14.4								54.5		○					
ST20-SLRB6-120-M 42			14	4	120				20	70		18.4	19.5			92	0.2					○					
ST16-SLSB6-140-M 60	1	10	2	140	60	16		80	—	—	15.5			112	0.1			64.5		○							
-SLSA6-140-M 70		9	1.5		70			70										74.5		○							
ST20-SLSA6-175-M105				175	105	20					19.5			147	0.3			109.5		○							
-SLSB6-175-M 95		10	2		95			80										99.5		○							
-SLRB6-175-M 60		14	4		60			115										64.5		○							
ST25-SLSB6-205-M127	2	10	2	205	127	25		70	135	23.3	24.5			177	0.5			104.5		○							
-SLSA6-230-M 97		9	1.5	230	97			120	110	19.2				202				94.5		○							
-SLRB6-240-M 42		14	4	240	42			170	70	18.4				212	0.7	11	50.8	160		○							
ST32-SLSB6-255-M157		10	2	255	157	32		70	185	26.5	31.5	M16	227	0.8		8	49.7	107.4		○							
ST25-SLSA6-305-M185	1	9	1.5	305	185	25		120	—	—	24.5	M10	277				91.7	166.1		○							
ST32-SLRB6-345-M 67	2	14	4	345	67	32		250	95	21	31.5	M16	317	1.6			50.5	73.5		○							
-SLSB6-375-M157		10	2	375	157			190	185	26.5				347	1.4			49.7	107.4	○							
ST19.05-SLS1/4-200	2	1/4	.37	.059	7.87	3.94	.750	.71	3.94	3.94	—	.728	M10	7.20	0.55	.28	—	2.76	—	○							
ST25-SLSA7-230-M 97	2	7	10	1.5	230	97	25	20	120	110	20.2	24.5	M10	212	0.5	8	—	69.8	—	○							
-320-M 97					320				210					302	0.9	7.5		44.7		○							
ST20-SLRB8-100-M 30	1	8	18	5	100	30	20	24	70	—	—	19.5	M10	72	0.2	—	—	—	—	○							
ST16-SLSA8-115-M 50			11	1.5	115	50	16		65		15.5				87	0.1					○						
ST20-SLSB8-145-M 70			13	2.5	145	70	20		75		19.5				117	0.2					○						
ST25-SLRB8-160-M 42	2		18	5	160	42	25		110	50	22.4	24.5			132	0.5					○						
ST20-SLSA8-175-M 85	1	11	1.5	175	85	20		90	—	—	19.5			147	0.3					○							
ST25-SLSB8-175-M 97	2	13	2.5		97	25		70	105	23.2	24.5				0.4					○							
-SLRB8-210-M 90	1	18	5	210	90			120	—	—				182	0.6	9	11	71.4	150	○							
-SLSA8-230-M 97	2	11	1.5	230	97				110	21.2				202		—	—	—	—	○							
-SLSB8-260-M140	1	13	2.5	260	140				—	—				232	0.7	9	11	121.4	200	○							
-SLSA8-280-M160		11	1.5	280	160									252				141.4	220	○							
ST32-SLRB8-285-M67	2	18	5	285	67	32		190	95	25	31.5	M16	257	1.3		14	75.8	185		○							
-SLSB8-375-M157		13	2.5	375	157				185	29.5				347	1.5	12	94.1	166.4		○							
ST25-SLSA9-230-M 97	2	9	12	1.5	230	97	25	30	120	110	22.2	24.5	M10	60	0.6	9.6	—	61	—	○							
-320-M 97				320					210												0.9						○
ST25.4-SLS3/8-230	2	3/8	.49	.059	9.06	3.82	1	11.18	4.72	4.33	.89	.965	M10	2.36	1.43	.40	—	2.40	—	○							
ST25-SLRB10-120-M 35	1	10	22	6	120	35	25	30	85	—	—	24.5	M10	60	0.4	10.6	—	61	—	○							
ST20-SLSB10-120-M 50			16	3		50	20		70		19.5										0.2						○
ST25-SLSB10-145-M 67	2					145	67		25		75	23	24.5									0.4					○
ST20-SLSA10-145-M 70	1		13	1.5		70	20			75	—	—	19.5									0.2					○
ST25-SLSB10-175-M105		16	3	175	105	25		70			24.5			154	0.5	11		155		○							
-SLRB10-210-M 90		22	6	210	90			120						149	0.7				150		○						
ST32-SLSB10-240-M170		16	3	240	170	32		70			31.5	M16	212	0.9		14	151.1	200		○							
ST25-SLSA10-255-M135		13	1.5	255	135	25		120			24.5	M10	194	0.7		—	195	—		○							
-SLSB10-275-M105		16	3	275	105			170						0.8						○							
ST32-SLRB10-285-M 67	2	22	6	285	67	32		190	95	29	31.5	M16	257	1.4		14	76.1	185		○							
-SLSA10-340-M210	1	13	1.5	340	210			130	—	—				312	1.3			191.1	270	○							
-SLSB10-360-M170		16	3	360	170			190						332	1.5			151.1	260	○							
ST42-SLSB10-445-M157	2				445	157	42		260	185	32.5	41.5	M24	417	2.7			97.1	165	○							
ST25-SLSA11-230-M110	1	11	14	1.5	230	110	25	30	120	—	—	24.5	M10	60	0.6	11.6	—	61	—	○							
-320-M110				320					210												0.9						○

Feature
Shrink-fit Heater
MONO 3°
MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS
Technical data

CODE	Fig.	φD	φC	t	L	M	D1	H	L1	L2	φC1	φC2	g	h		φD2	φD3	H1	H2
ST25-SLSB12-120-M 42	2	12	19	3.5	120	42	25	30	70	50	23.4	24.5	M10	60	0.3	12.6	-	61	-
ST20-SLSA12-120-M 50	1		15	1.5		50	20			-	-	19.5			0.2				
ST32-SLRB12-140-M 60			26	7	140	60	32		80			31.5	M16	112	0.7	13		109.5	
ST25-SLSB12-150-M 80			19	3.5	150	80	25		70			24.5	M10	60	0.4		11	61	130
ST32-SLSB12-220-M150					220	150	32					31.5	M16	192	0.9		14	131.7	180
ST25-SLSA12-230-M110			15	1.5	230	110	25		120			24.5	M10	60	0.6	12.6	11	61	-
-SLSB12-250-M 80			19	3.5	250	80			170						0.8	13			170
ST32-SLRB12-260-M 70			26	7	260	70	32		190			31.5	M16	232	1.3		14	51.7	160
-SLSA12-315-M185			15	1.5	315	185			130					287	1.2			166.7	245
-SLSB12-340-M150			19	3.5	340	150			190					312	1.5			131.7	240
ST42-SLSB12-445-M157	2				445	157	42		260	185	35.5	41.5	M24	417	2.8	12.6		59.5	162.5
ST25.4-SLS1/2-230	1	1/2	.62	.059	9.06	4.33	1	1.18	4.72	4.33	-	.965	M10	2.36	1.33	.52	-	2.40	-
ST32-SLRB16-175-M 45	1	16	32	8	175	45	32	32	130	-	-	-	M16	80	0.8	16.6	-	81	-
ST25-SLSB16-175-M 50			24	4		50	25		125				M10		0.5				
ST32-SLSB16-290-M100					290	100	32		190			31.5	M16		1.4	17	14		190
ST42-SLRB16-355-M 67	2		32	8	355	67	42		260	95	39	41.5	M24	327	2.7		21	73.5	-
-SLSB16-445-M157	1		24	4	445	157				-	40.5			417	3			165.8	424.5
ST42-SLRB20-170-M 70	1	20	38	9	170	70	42	40	100	-	-	41.5	M24	142	1.3	21	21	109.5	154
ST32-SLSB20-175-M 50			29	4.5	175	50	32		125			31.5	M16	80	0.8		-	81	-
ST42-SLSB20-255-M155					255	155	42		100			41.5	M24	227	1.7		22	194.5	
-SLRB20-330-M 70			38	9	330	70			260					302	2.6		22.6	189.5	314
-SLSB20-415-M155			29	4.5	415	155								387	2.9	21.6	22	69.5	135
ST42-SLRB25-170-M 42	2	25	45	10	170	42	42	45	100	70	49.6	53	M24	120	1.5	26	22.6	121	154
-250-M 42					250				180		49.4	50		80	2.1	25.6	22	81	-



Carbide type



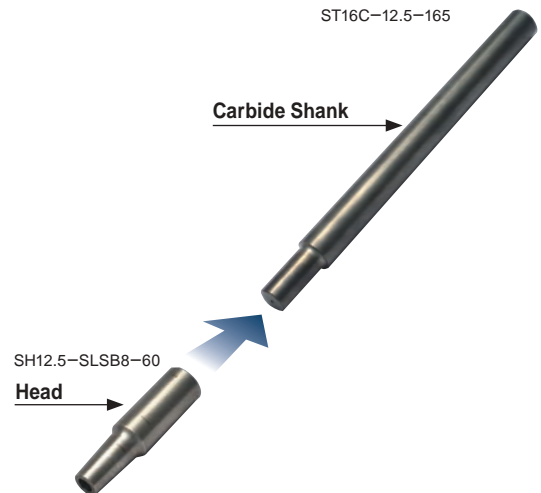
Caution

- Setting cutters · Be sure to insert the tool beyond the safety mark.

CODE	φD	φC	t	L	M	D1	H	L1	L2	φC1	φC2	h	Kg	φD2	φD3	H1					
ST10C-SLSA 3-160	3	6	1.5	160	12	10	9	120	40	7.3	10	19	0.2	4	-	17					
ST16C-SLSA 3-280				280		16		182	98								0.7				
ST10C-SLSA 4-160	4	7	1.5	160	12	10	12	120	40	8.3	10	19	0.2	5	-	17					
ST16C-SLSA 4-280				280		16		182	98								0.7				
ST12C-SLSB 6-175	6	10	2	175	19.1	12	18	125	50	-	12	27	0.3	7	-	25					
ST16C-SLSB 6-225				225	22	16		165	60							12.3	16	32	0.6	28	
ST20C-SLSB 6-320				320		20		221	99										1.3	8	
ST25C-SLSB 6-360				360		25		242	118								20	38	2.2	33	
ST16C-SLSB 8-225	8	13	2.5	225	22	16	24	165	60	15.3	16	32	0.6	9	-	28					
ST20C-SLSB 8-270				270				20	200							70		20	38	1.1	33
ST25C-SLSB 8-360				360				25	242							118				2.2	
ST20C-SLSB10-270	10	16	3	270	22	20	30	200	70	18.3	20	38	1.1	11	-	33					
ST25C-SLSB10-360				360				25	242								118				2.2

The Parts Code List for Carbide Straight Arbor

SET-CODE	CARBIDE SHANK	HEAD
ST10C-SLSA 3-160	ST10C- 7 -120	SH 7 -SLSA 3-40
-SLSA 4-160		-SLSA 4-40
ST12C-SLSB 6-175	ST12C- 9 -125	SH 9 -SLSB 6-50
ST16C-SLSA 3-280	ST16C- 7 -240	SH 7 -SLSA 3-40
-SLSA 4-280		-SLSA 4-40
-SLSB 6-225		SH12.5 -SLSB 6-60
-SLSB 8-225		SH12.5 -SLSB 8-60
ST20C-SLSB 6-320	ST20C-12.5-260	SH12.5 -SLSB 6-60
-SLSB 8-270	-16 -200	SH16 -SLSB 8-70
-SLSB10-270		SH16 -SLSB10-70
ST25C-SLSB 6-360	ST25C-16 -290	SH16 -SLSB 6-70
-SLSB 8-360		-SLSB 8-70
-SLSB10-360		-SLSB10-70



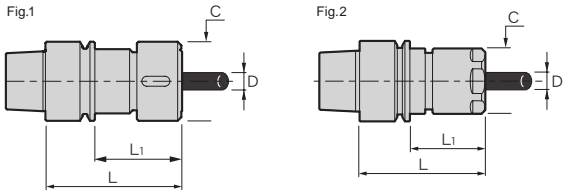
The other holders

COLLET HOLDER (CTH/CTS)



E32-CTH10-55

E32-CTS10-50

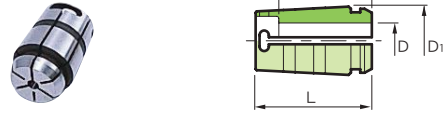


CODE	Fig.	ϕD	L	ϕC	L1	KG
E32-CTH10-55	1	2.4 ~ 10	55	32	35	0.2
-CTS10-50 (※)	2		50	26	30	
E40-CTH10-55	1	2.4 ~ 10	55	32	35	0.4
E50-CTH10-60			60	36	34	0.7
-90			90		64	0.9
-CTH20-75		5.8 ~ 20	75	50	49	
F63-CTH10-60	1	2.4 ~ 10	60	36	34	0.9
-90			90		64	
-CTH20-75		5.8 ~ 20	75	50	49	

■ Option ● Spring collet ● Spanner

■ Caution ● ※=It cannot use collapsibility of a collet.
The holding diameter applies only to the reference diameter of collet.

Spring collet



CODE	ϕD	L	ϕD_1	H	Holder type
Precision Collet	2.6 ~ 5 (0.2mm steps)	26	17.2	16	CTH10
	5.2 ~ 5.8 (0.2mm steps)			18	CTS10
	6 ~ 10 (0.2mm steps)			20	
C10-D-P	6 ~ 10 (0.2mm steps)	50	29.5	29	CTH20
	10 ~ 15.8 (0.2mm steps)			33	
	16 ~ 20 (0.2mm steps)			40	

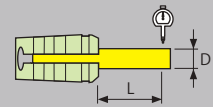
Spanner / Wrench

CODE	Fig.	Shank type	L
FC-32	1	E32 - CTH10	120
-36		E40 - CTH10	208
-50		- CTH20	281
RC-26	2	E32 - CTS10	240

Accuracy

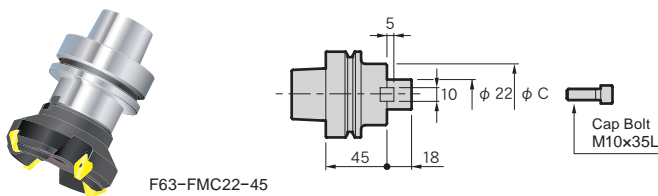
Runout accuracy	Nominal shank size
Precision Collet	5 μm

※Accuracy of collet alone



D	L
~ 10	4 × D
10.2 ~ 20	40

Face Mill Arbor (FMC)



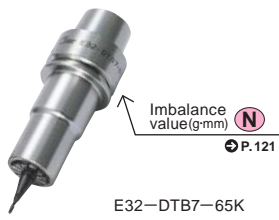
F63-FMC22-45

CODE	Cutter dia	ϕC	KG
E50-FMC22-45	50, 63	42	0.7
F63-FMC22-45		45	1.0

■ Std. Access. ● Cap Bolt ● Stopper Key

■ Note ● The cap bolt may differ depending upon the shape of the cutter.

DETa-1 Collet Holder (DTA / DTB)



CODE	φD	L	φC	L1	kg	N
E25 -DTB 3- 58	0.5 ~ 3.175	58	10	27	0.1	0.4
E32 -DTA 3- 75	0.5 ~ 3.175	75	10	27	0.2	1.8
-DTB 3- 65		65			0.2	0.6
-DTB 7- 65K※	1 ~ 7		21	33		0.9
E40 -DTA 3- 75	0.5 ~ 3.175	75	10	27	0.2	1.7
-DTB 3- 70		65			0.3	0.9
-DTB 7- 95	1 ~ 7	95	21	50	0.4	1.6
DTB12-110	2.5 ~ 13	110	30	90	0.5	2.8
E50 -DTA 3- 80	0.5 ~ 3.175	80	10	27	0.5	2.1
-DTB 3- 75		75				1.7
-DTB 7-100	1 ~ 7	100	21	50	0.6	3.2
-DTB12-115	2.5 ~ 13	115	30	89	0.8	4.2
F63 -DTA 3- 90	0.5 ~ 3.175	90	10	27	0.8	2.3
-120		120			0.9	2.7
-DTB 3- 75		75			0.7	2.1
-105		105			0.8	2.5
-105L				57	0.7	2.1
F63M-DTB 7-100	1 ~ 7	100	21	50	0.9	3.3
-DTB12-120	2.5 ~ 13	120	30	70	1.1	4.8

- Option *DETa-1 Collet *Spanner *Wrench
- Std.Access. *Rod(DTA3)
- Caution *※=It cannot use collapsibility of a collet.
The holding diameter applies only to the reference diameter of collet.

CODE	φD	Collapsibility	φD1	L	H1	H2	Holder type
Precision Collet							
D 3- 0.6-P	0.5 ~ 0.6	0.1	7	40	36	6.9	DTA 3 DTB 3
- 0.8-P	0.6 ~ 0.8	0.2					
- 1 -P	0.8 ~ 1.0	0.5				7	
- 1.5-P	1.0 ~ 1.5					7.2	
- 2 -P	1.5 ~ 2.0					7.3	
- 2.5-P	2.0 ~ 2.5					7.4	
- 3 -P	2.5 ~ 3.0					7.6	
- 3.175-P	2.7 ~ 3.175						
D 7- 1.5-P	1 ~ 1.5		0.5	17	50	36	7
- 2 -P	1.5 ~ 2	1				10	
- 2.5-P	2 ~ 2.5					12	
- 3 -P	2.5 ~ 3						
- 4 -P	3 ~ 4					14	
- 5 -P	4 ~ 5					16	
- 6 -P	5 ~ 6						
- 7 -P	6 ~ 7						
D12- 4 -P	2.5 ~ 4	1.5	26	70	50	16	DTB12
- 6 -P	4 ~ 6	2				20	
- 8 -P	6 ~ 8					22	
-10 -P	8 ~ 10						
-12 -P	10 ~ 12						
-13 -P	11 ~ 13						

Accuracy

Runout accuracy	D3	D7-D12
Precision Collet	3 (6) μm	5 (10) μm

※Accuracy of collet alone

D	L
~10	4 × D
10 ~ 13	40

Spanner Wrench

CODE	Shank type	Fig.	L	B	Clamping torque (kgf)
F -22	DTA 3	1	110	-	0.2~0.3
DW-2.5-110	DTB 3	2			
TW-4	E32 -DTB 7	3	100	4	1.4
-5	-DTB 7	4	153	5	3.4
-6	DTB12		173	6	1.4
W -135DR	E40 -DTB12	5	110	5	1.8
	F63M -DTB 7			1.4	
	-DTB12		132.5	1.8	

Cleaning Tool(DTA3 / DTB3)

Please use to clean the inside of the holder.

CODE	Q'ty
PCT01-10	10
-25	25

Rod (DTA3 type)

The rod is required to a collet when attaching to the holder.

CODE	Shank type	Q'ty
PR-DTA3	DTA3	2

Retention knob

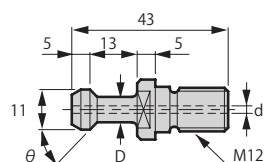


■ Caution

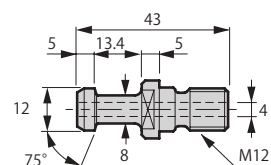
- Retention knobs in this catalog are typical models for various machine tool companies. Confirm the correct retention knob design using the machine specifications sheet.
- We manufacture other kinds of retention knobs. Please consult us for the detail.
- When heating Mono Series shrink-fit holders, use a retention knob with a through-hole or remove the retention knob before heating. If you use a retention knob without a through-hole for the Mono Series shrink-fit holders, a cutter cannot be inserted into the holder because the air in the holder is not released. We can provide you with a retention knob with an air drain hole.

Compatible manufacturers	Standard type						For through spindle coolant type		
	BT30		BT40		BT50		BT30	BT40	BT50
	Standard type	Standard type with a through hole	Standard type	Standard type with a through hole	Standard type	Standard type with a through hole			
OKUMA	—		P40T-2	P-339 (MB series)	P50T-2	P-419	—	P-499	P-419
	—		P40T-1	P-297 (MILLAC series)					
OKK	—		P40T-1	—	P-143	—	—	—	—
OHTORI	—		P40T-1	P-297	P50T-1	P-299	—	—	—
KITAMURA	P30T-1	P-445	P-348	P-323-1	P-400		—	P-323-1	P-400
	P-399(Mycenter-1Xi)								
KIRA	P30T-1	P-445	P40T-1	P-297	—		—	P-323-1	—
KIWA	P30T-1	P-445	P-348	P-323-1	P-400		—	P-323-1	P-400
KURASHIKI	—		P40T-1	P-297	P50T-1	P-299	—	—	—
KOMATSU NTC	P30T-1	P-445	P40T-1	P-297	P50T-1	P-299	P-522	P-505	P-384
JTEKT	—		P40T-1	P-297	P50T-1	P-299	—	P-297	P-299
SHIZUOKA	P30T-1	P-445	P-141	P-498	P-143	P-402	—	—	—
SNK	—		P40T-2	P-339	P50T-2	P-419	—	—	—
SUGINO	P30T-2	P-497	—		—		—	—	—
DMG MORI	P30T-1	P-445	P-141	—	P-143	—	—	P-435	P-513
TOSHIBA MACHINE	—		—		P50T-1	P-299	—	—	—
NIIGATA MACHINE TECHNO	—		—		P50T-2	P-419	—	—	—
FANUC	P30T-1	P-522	—		—		P-522	—	—
BROTHER	P30T-2	P-511	—		—		P-511	—	—
HOWA	P30T-1	P-445	P40T-1	P-297	P50T-1	P-299	—	—	—
MAKINO	—		P40T-1	P-297 (V series)	P50T-1	P-299 (A series, MCC series, V series.)	—	P-323-1	P-299
	—		P-348	P-323-1 (a series, D series)	P-400 (A series, a series)				
MATSUURA	P30T-2	P-511	P-348	P-323-1	P50T-2	P-419	—	P-323-1	—
	P-399				P-400				
MITSUMI SEIKI	—		P-007	—	P-008	P-250	—	—	—
MITSUBISHI	—		P40T-1	—	P50T-2	—	—	—	—
YASDA	—		P-348	P-438	P50T-1	P-299	—	P-509	P-459
	—				P-400 (YBM1218V)		—		
YAMAZAKI GIKEN	—		P40T-1	P-297	P50T-2	P-419	—	—	—
MAZAK	—		P-227		P-514		—	P-227	P-514

BT30

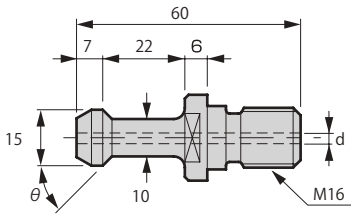


CODE	ϕD	ϕd	θ	NOTE
P30T-1	7	—	45	MAS-1
P-445		3		P30T-1 through hole
P30T-2		—	60	MAS-2
P-497		2		P30T-2 through hole
-522	8	4	45	FANUC center-through
-511	7.5	2.5	60	BROTHER center-through

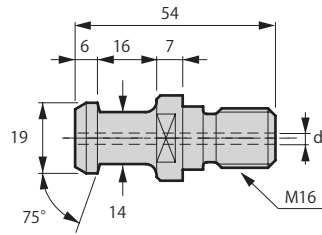


CODE	NOTE
P-399	JIS30P

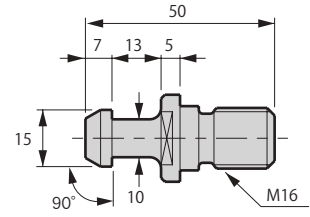
BT40



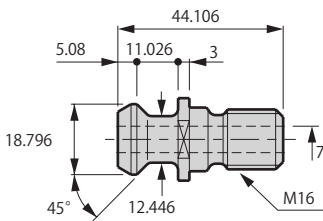
CODE	ϕd	θ	NOTE
P40T-1	—	45	MAS-1
P-297	4		P40T-1 through hole
P40T-2	—	60	MAS-2
P-339	4		P40T-2 through hole
P-141	—	90	—
-498	4		P-141 through hole
-505	3	45	KOMATSU NTC center-through



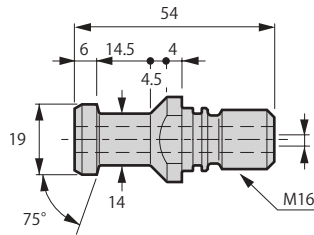
CODE	ϕd	NOTE
P-348	—	JIS40P
-323-1	7	P-348 through hole
-499	4	OKUMA center-through
-438	7	YASDA through hole
-509		YASDA center-through



CODE	NOTE
P-007	MITSUI SEIKI

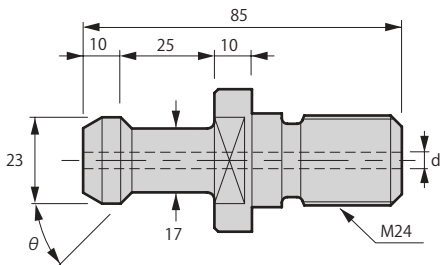


CODE	NOTE
P-227	MAZAK

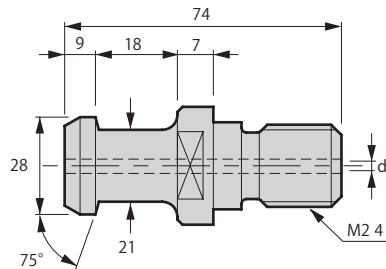


CODE	NOTE
P-435	DMG MORI center-through

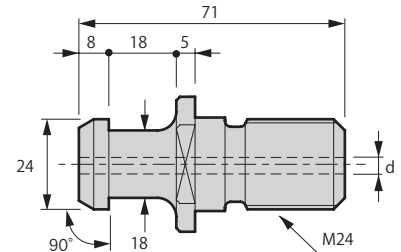
BT50



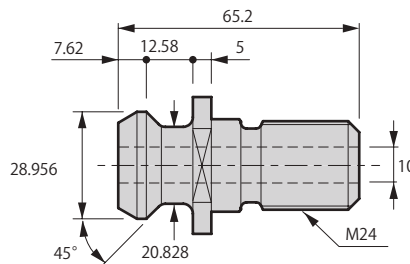
CODE	ϕd	θ	NOTE
P50T-1	—	45	MAS-1
P-299	6		P50T-1 through hole
P50T-2	—	60	MAS-2
P-419	6		P50T-2 through hole
P-143	—	90	—
-402	7		P-143 through hole
P-459	7	45	YASDA center-through
-513	8	90	DMG MORI center-through
-384	5.5	45	KOMATSU NTC center-through



CODE	ϕd	NOTE
P-400	10	JIS50P
-288-1	6	P-400 through hole



CODE	ϕd	NOTE
P-008	—	MITSUI SEIKI
-250	8	P-008 through hole



CODE	NOTE
P-514	MAZAK

SLIMLINE collet installation


You can install a SLIMLINE collet without removing the retention knob if the center hole dia. is more than 6mm.

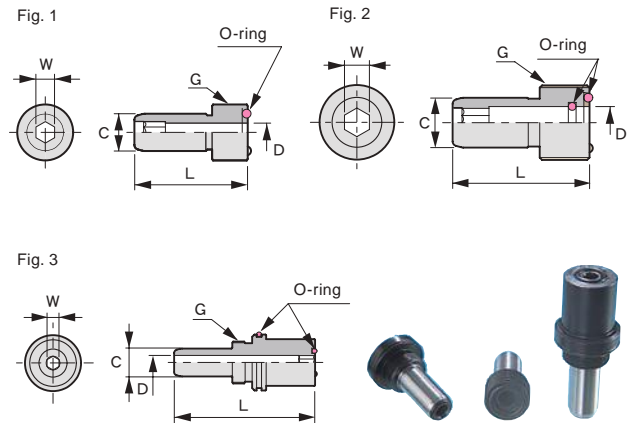


Coolant duct (HSK-A)


Coolant duct (fixed type)

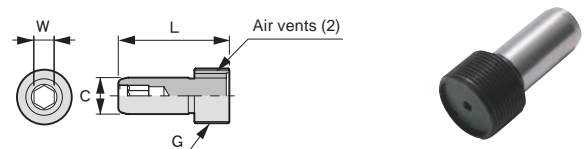
A coolant duct comes with below shank holders as a standard accessory.

CODE	Fig.	ϕC	L	ϕD	W	G	
CD 40-01	1	8	29.5	4	4	M12X1	HSK-A 40
-03	3						
-04							
CD 50-01	1	10	33	5	5	M16X1	HSK-A 50
-03	3		39				
-04			59				
CD 63-01	1	12	36.5	6	6	M18X1	HSK-A 63
-02	2						
-03	3				5		
-04							
CD100-01	1	16	44	8	8	M24X1.5	HSK-A100
-02	2			10.3			



Dummy duct

CODE	ϕC	L	W	G	
CD 40-A1	8	29.5	4	M12X1	HSK-A 40
CD 50-A1	10	33	5	M16X1	-A 50
CD 63-A1	12	36.5	6	M18X1	-A 63
CD100-A1	16	44	8	M24X1.5	-A100



⚠ Cautions for shrinking operation.

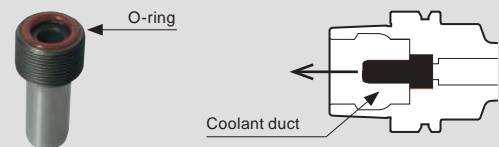
Remove the coolant duct when using the hot air heater.

If not, the O-ring will be damaged by the heat.

(Removal is not necessary with the induction heater.)

Use the dummy duct when the spindle coolant capability is not in use.


The dummy duct does not need to be removed when heated.

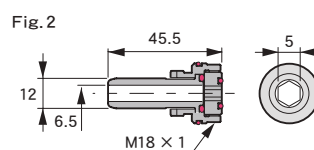
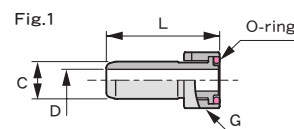


Coolant duct (Swing type)

Some machine tool companies recommend using a swing type coolant duct.

We can exchange our standard fixed type coolant duct with a swing type at your request.

CODE	Fig.	ϕC	L	ϕD	G	
CD 63-01F	1	12	36.5	7	M18×1	HSK-A 63
-03F	2		45.5	6.5		
CD100-01F	1	16	44	10	M24×1.5	-A100

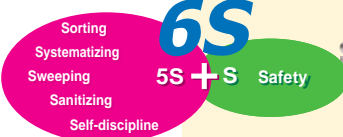


TOOL SET UP STATION

Work table

6S DESK

CODE
6SD-01



- Helps in the rapid implementation of the 5 S's in your factory.
- Ensures safe tool settings.
- Easy-to-assemble, simple, compact, prefabricated type.



Backside
•Dust Shooter
•Tool Cap Dispenser
•Hanger



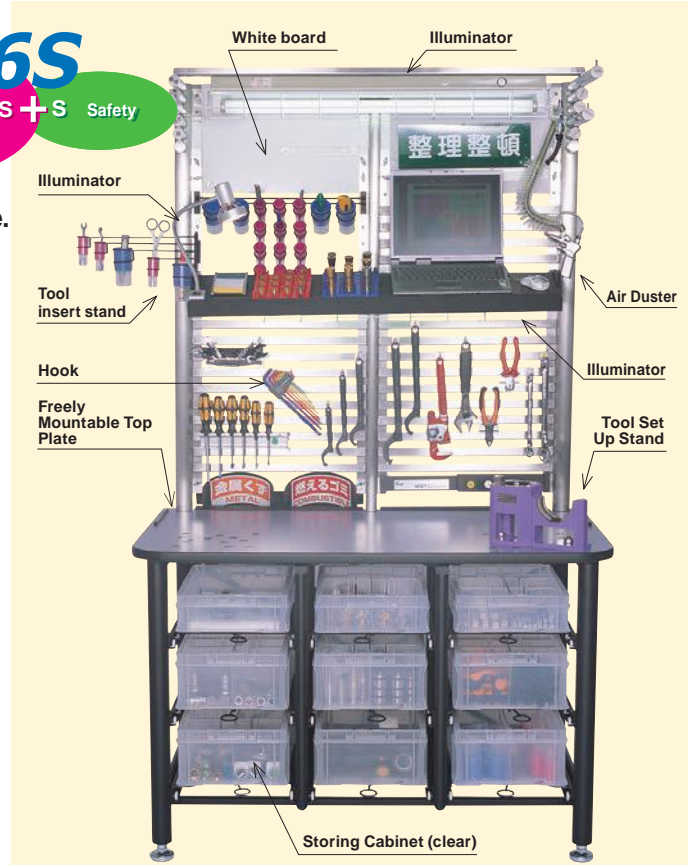
Freely Removable Drawer



Freely mountable and interchangeable hooks



Tools and vises can be freely clamped/mounted.



*This image includes the options.

Tool washing machine

CLEAN BOX

CODE
CBX-01

- Tools including cutters and jigs are washable with no need to breaking them down.
- Compact type with built-in sink.
- No plumbing required.
- Safe cleaning system using water.
- Comes with a washing water heater for ensuring comfortable working conditions even in winter.



Compact built-in sink



Washing shower equipped with automatic shutoff function, when opened



Hand washing



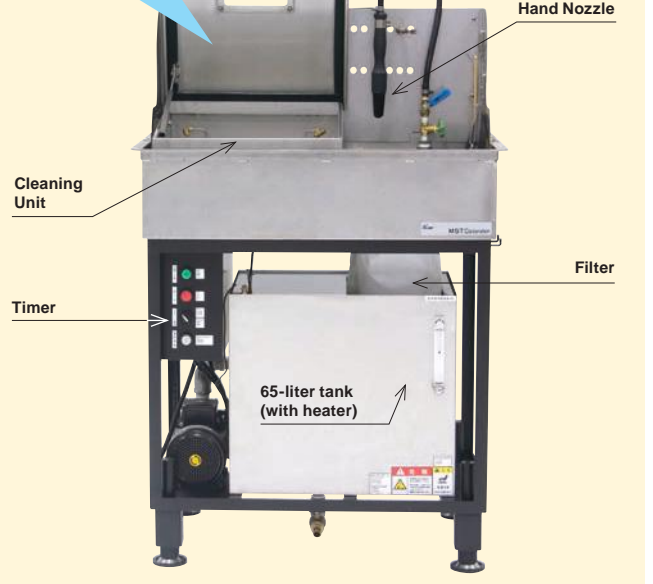
Automatic washing from 18 nozzles.

Wash Tool holder/Collet/Nut/Cutting tools thoroughly to maintain their high accuracy.



Light dirt is automatically washed away by the built-in washing shower.

Hand-wash tough dirt using the hand nozzle.



*This image includes the options.

Cutting tool cover that keeps the cutting tool visible, will not slip off or break, and is user-friendly



Protects the cutting tool and is user-friendly.

The cutting tool cover protects the user from injury at the time of work while protecting breakage of the cutting edge.

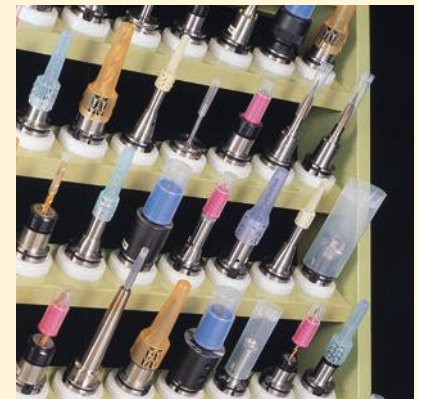


Not slip off

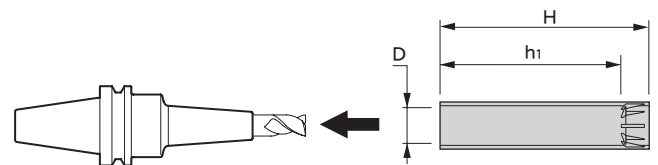


Cutter Case

Tool Cap



CODE	ϕD	h_1	H	Q'ty
TCD03-50	3	—	25	50
TCD04-50	4	—	32	50
TCC0607- 50	5.4~ 6.7	35	40	50
-100				100
-500				500
TCC0709- 50	6.8~ 8.9	35	40	50
-100				100
-500				500
TCC0911- 50	8.9~10.9	65	70	50
-100				100
-500				500
TCC1113- 50	10.9~13.4	65	70	50
-100				100
-500				500
TCC1418- 25	13.8~17.8	100	110	25
- 50				50
-250				250
TCC1822- 25	17.8~22.4	100	110	25
- 50				50
-250				250
TCC2228- 25	22.3~28	135	150	25
- 50				50
-250				250
TCC2836- 10	28.0~36	130	150	10
- 20				25
- 50				50
-200				200
TCC3646- 10	36.2~47	165	190	10
- 20				25
- 50				50
-200				200
TCC4760- 10	46.0~60	160	190	10
- 20				25
- 50				50
-200				200



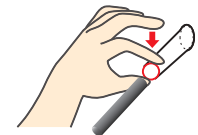
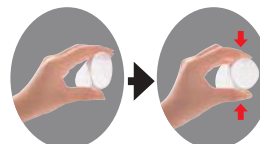
Variety Set

Each size comes in a set of two.

CODE	Q'ty
TCC-F	2 pieces per cutting tool over size for TCC0607 to 4760 (total of 20 pieces per set)

Usage

- Hold the mouth of the tool cap vertically, and then press it so that its oval shape becomes round.
- Once the mouth of the tool cap becomes round, push it into the cutting tool or tool.



TCA type — The TCA-type cutting tool cover is used by attaching it to the tip of a tool holder.

TCB type — This cutting tool cover is attached to the cutting tool.

TCA type

TCB type

General catalog for further eference...



The setup time can be shortened.

Not only can you mount cutting tools simply and quickly without using other tools, but also clamping collets and retention knobs!

フューボール
Petit Ball 40
BT40

マキューブ
MY CUBE 50
BT50

HF SERIES

BT30/BT40/BT50
HSK-A40/A50/A63/A100
E32/E40/E50/F63

Freely set vertically or horizontally



マキューブ
MY CUBE 100
HSK-A100

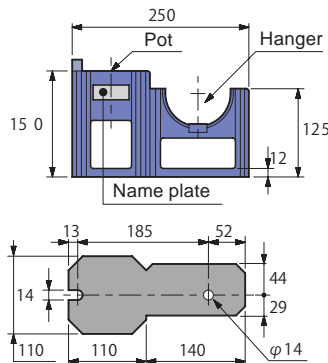
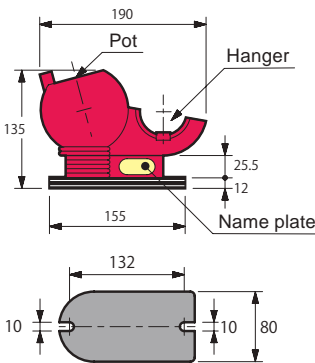


Petit Ball / MY CUBE

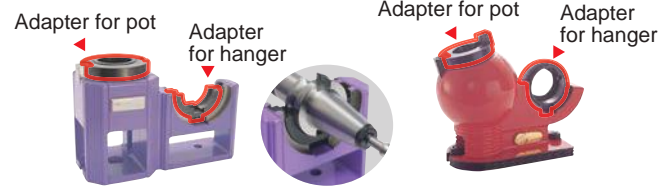
CODE	Shank type	Kg
PETIT BALL40	BT40 / CAT.40 / DIN40	6.1
MY CUBE 50	BT50 / CAT.50 / DIN50	9.7
MY CUBE100	HSK-A100	9.6

- Option
 • Adapter (Petit Ball, MY CUBE 50)
 ■Std.Access.
 • Name plate

- Caution
 • Prepare 2 bolts for installation.
 (Petit Ball : M8, MY CUBE : M12×2).



CODE	Model	Adapter	Shank type
AP40-T30V	Petit Ball 40	For pot	BT30
-T30H		For hanger	BT30
AP50-T30V	MY CUBE 50	For pot	BT30
-T40V			BT40/CT40 / DN40
-A63V			HSK-A63, T63
-F63V		HSK-F63	
AP50-T30H		For hanger	BT30
-T40H			BT40
-A63H	HSK-A63, T63		
-F63H	HSK-F63		



At your request, your company name will be engraved.
 (Petit Ball, MY CUBE)



Petit Ball



MY CUBE

HF series

CODE	Fig.	Shank type	H	W	A	t	Kg
HF-BT30	1	BT30	77	70	50	30	0.8
-BT40		BT40	90	90	60	37	1.2
-BT50		BT50	—	—	—	—	2.2
-A40	1	HSK-A40, T40	72	60	35	30	0.8
-A50		-A50, T50	88	70	50	37	1.0
-A63		-A63, T63	87	90	—	—	1.2
-A100	2	-A100, T100	—	—	—	—	2.1
-E32	3	-E32	98	64	35	24	1.0
-E40		-E40	100	70	—	—	1.1
-E50		-E50	106	80	50	26	1.3
-F63		-F63	120	90	60	—	1.6

Fig. 1

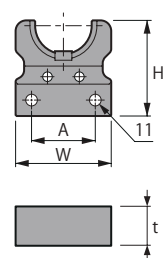


Fig. 2

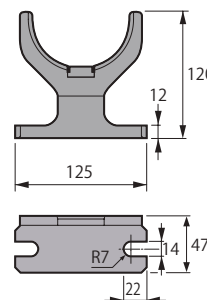
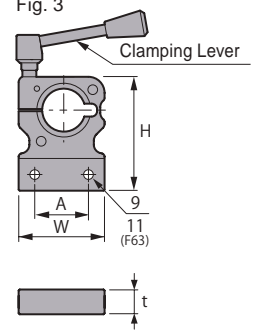
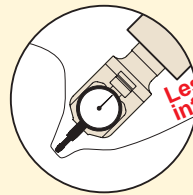
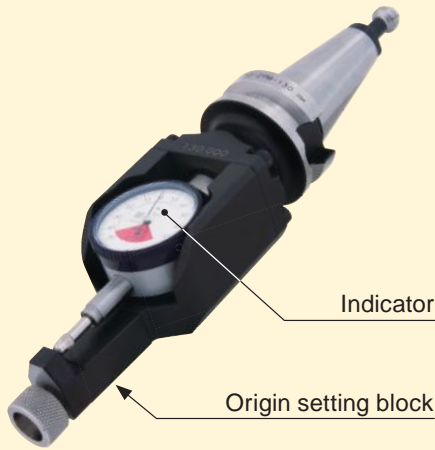


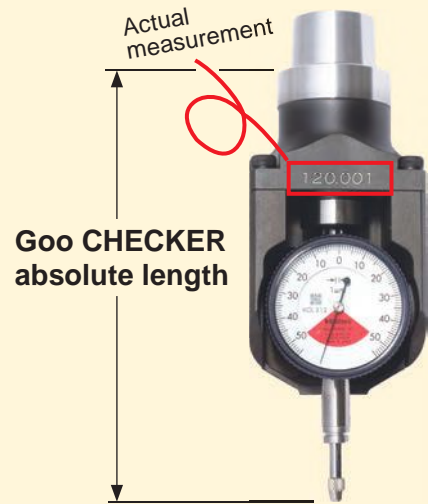
Fig. 3



Shareable Z-axis origin for multiple machining centers.
Easy work-piece origin setting.
Precise work-piece flatness and step measurement possible!



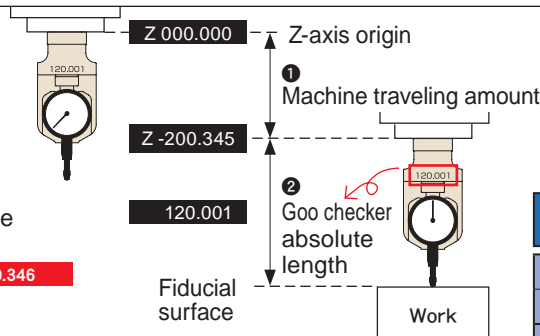
Available for using 5-axis machine.



Goo CHECKER absolute length

Easy Z-axis origin setting

Easy measurement for Z-axis origin to work-piece datum surface.



<Ex.>

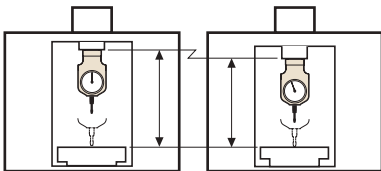
Distance from Z-axis origin to work-piece datum surface.

$$200.345 + 120.001 = 320.346$$

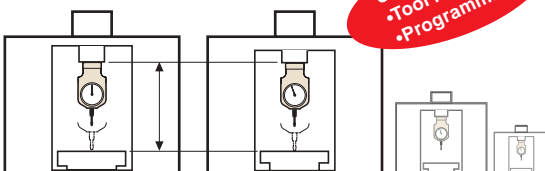
- 1 Machine traveling amount 2 Goo checker absolute length

Sharable Z-axis origin for several machining centers

After measuring the distance from the Z-axis origin to the table surface of each machining center and correcting any variations, multiple machining centers can share Z-axis origin.

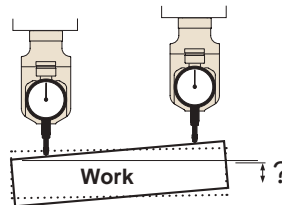


Correcting actual measurement variations



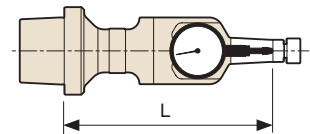
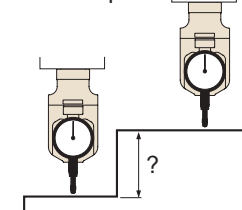
Work-piece position measuring

Precise measurement for flatness



Step distance measurement

Measurement for steps on the work piece



CODE	L	Kg
BT30-ZPM-130	130	1.0
-165	165	1.2
BT40-ZPM-150	150	1.3
-210	210	1.5
BT50-ZPM-180	180	2.9
-240	240	4.1
A 63-ZPM-150	150	1.2
-210	210	1.5
A100-ZPM-180	180	2.5
-240	240	3.8
E 32-ZPM-120	120	0.7
-165	165	1.0
E 40-ZPM-120	120	0.8
-180	180	1.1
E 50-ZPM-150	150	1.0
-195	195	1.3
F 63-ZPM-150	150	1.1
-210	210	1.3
DN40-ZPM-150	150	1.3
DN50-ZPM-180	180	2.9
CT40-ZPM-150	150	1.3
CAT. CT50-ZPM-240	240	4.1

- Option
 - Retention knob(BT/ CT/ DN)
- Std. Access.
 - Origin setting block •Indicator, 1/1000 reading
- Caution
 - A.T.C is not available. (except for BT30)

Ideal for checking machine spindle run-out accuracy easily.

Managing spindle accuracy will maximize tool holder performance and increase productivity.

- Light-weight, hollow design makes it easy to use.
- Ideal for setting Z axis datum.
- Reasonable price.



You can recognize the exact run-out accuracy and the highest run-out of the spindle.

The actual measurement values are marked on the body.



It can be installed into the spindle in every phase.

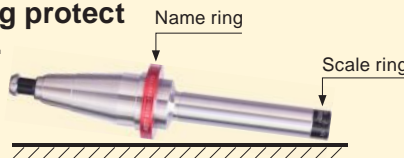
Drive-key less design allows you to install the test bar in every phase, making the run-out check easier than ever.



No drive key ways.

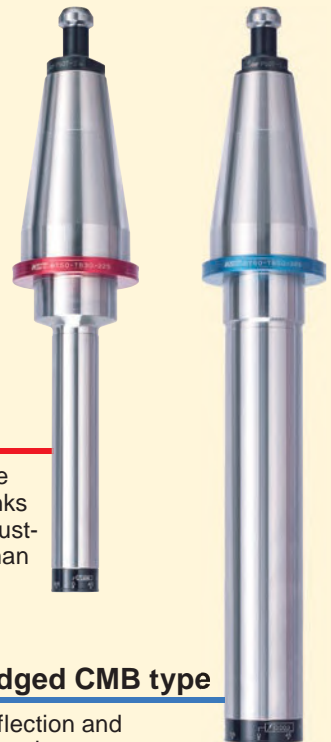
The name ring and scale ring protect it from scratches and dents.

The taper area and straight area do not touch the table surface even if they are placed horizontally.



Handy CMA type

Allows you to check the dynamic accuracy thanks to optional balance adjustment to achieve less than G2.5 at 30,000min-1.



Full-fledged CMB type

Z-axis deflection and spindle travel accuracy can be measured.

CODE		Fig.	φD	φD ₁	L	L ₁	L ₂	L ₃	Kg				
For both BT / CAT. / DIN	NT 30-CMA20-125	1	20	32	125	45	65	15	0.7				
	NT 40-CMA25-175	2	25	42	175	50	110		1.3				
	NT 50-CMA30-225		30	53	225	65	145		3.5				
	NT 30-CMB30-175	1	30	32	175	45	115	15	1.0				
	NT 40-CMB40-325	2	40	42	325		265		2.8				
	NT 50-CMB50-325		50	53		60	250		5.7				
For both HSK-A and HSK-E	HSK 32-CMA20-125	3	20	26	125	35	75	15	0.4				
	HSK 40-CMA20-125			32		45	65		0.5				
	HSK 50-CMA25-175			25		42	175		50	110	1.0		
	HSK 63-CMA25-175								1.2				
	HSK 80-CMA30-225		30	53	225	65	145		2.2				
	HSK100-CMA30-225								3.0				
	HSK125-CMA30-225								4.1				
	HSK 32-CMB25-175	3	25	26	175	35	125	15	0.7				
	HSK 40-CMB30-175			30		32	40		120	0.9			
	HSK 50-CMB40-225			40		42	225		45	165	1.8		
	HSK 63-CMB40-325						325			265	2.7		
	HSK 80-CMB50-325			50		53			60	250	4.4		
HSK100-CMB50-325										5.2			
HSK125-CMB50-325						6.3							
Exclusive use for HSK-F	HSK63F-CMA25-175	3	25	42	175	50	110	15	1.2				
	HSK80F-CMA30-225			30					53	225	65	145	2.3
	HSK63F-CMB40-325			40					42	325	45	265	2.7
	HSK80F-CMB50-325			50					53		60	250	4.5

Std. Access.

- Accuracy inspection sheet

Option

- Coolant duct (HSK-A) • Special retention knob (CAT. / DIN)
- Balance adjustment (only for CMA type) less than G2.5 / 30000min-1

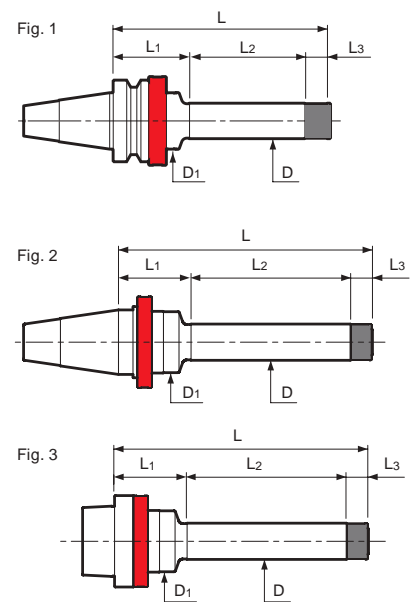
*Please order by adding "BL" to the end of the code. (Ex.: HSK63-CMA25-175 BL)

Note

- NT type is available for BT/CAT. and DIN spindle by changing the retention knob. HSK type is available for both HSK-A and HSK-E spindles.
- HSK-F type is available only for HSK-F spindle.

Caution

- Use a market standard retention knob for the BT spindle.
- A special design retention knob is required for CAT./DIN spindle. A market standard retention knob for ANSI/DIN/ISO is not available. Contact MST for details.
- NT30 type can be installed into a spindle at 0° and 180°.
- A.T.C is not available. (except for NT30)



Exclusive retention knob

CODE	Shank
P-576	CAT.40
-575	CAT.50
-578	DIN40
-577	DIN50

TOOL HOLDER STORING CABINET

Compact Storage Box for anti-rust treatment of tool holders.

Orderly storing with name plate



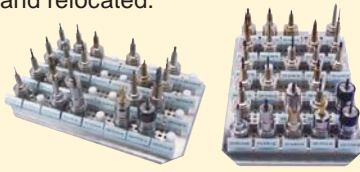
Name Plate

Transparent case!!

HBX

Arrangeable

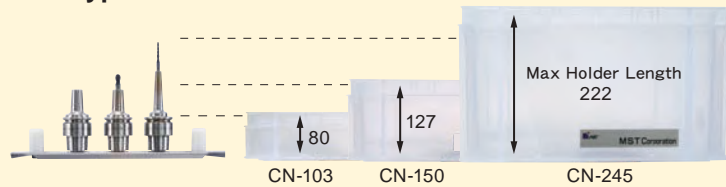
A multi-hole base plate is employe. Supports a variety of holder specifications using pins that can be freely changed and relocated.



Horizontal type

Vertical type

Holders with different lengths can be stored using three types of container boxes.



Standard Set

CODE	max. Q' ty	Container box	Pin	Number of pins supplied	Shank type
HBX-A40	24	CN-150	HBX-PNE40	18	HSK-A40
-A50	15	-245	-PNE50	15	-A50
-E25	40	-150	-PNE25	32	-E25
-E32			-PNE32		-E32
-E40	24		-PNE40		-E40
-E50	15	-245	-PNE50	15	-E50
-F63	10				-F63
-15T	40	-150	-PN15T	16	15T(BROTHER)
-20T			-PN20T		20T(SUGINO)

Contents of set

- Base plate ●Container box ●Pin

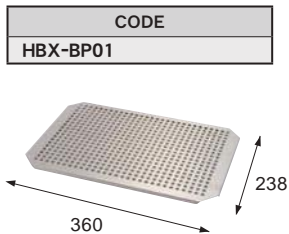
Option

- Rail ●Name Plate ●Lid for Container Box ●Eyenut

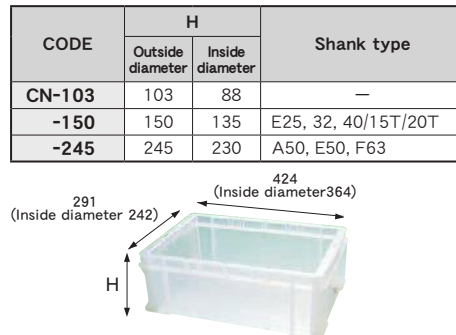
Note

- Knock-down type. A wrench (5mm) is required.

Base plate



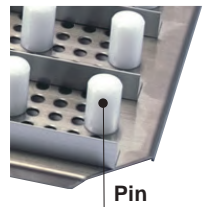
Lid for container box



Pin

CODE	Q' ty	Size
HBX-PNE25	10	φ 13.5 × H20
-PNE32		φ 16.5 × H25
-PNE40	5	φ 20.5 × H29
-PNE50		φ 25.5 × H36
-PN15T		φ 26.5 × H54
-PN20T		φ 30.5 × H62

- Std. Access. ●Mounting bolt (M5)



Pin

Eyenut

CODE	Q' ty
HBX-ENM6	2

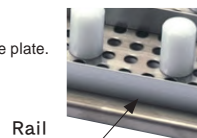
- Std. Access. ●Mounting bolt M6



Rail (for name plate)

CODE	Q' ty	L	Note
HBX-R210	6	210	Vertical type
-R330	4	330	Horizontal type

- Std. Access. ●Mounting bolt M5
- Required for attaching name plate.

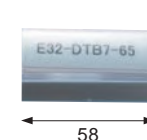


Rail

Name plate

CODE	Q' ty
HBX-NP01	40

Attaches easily to the rail.



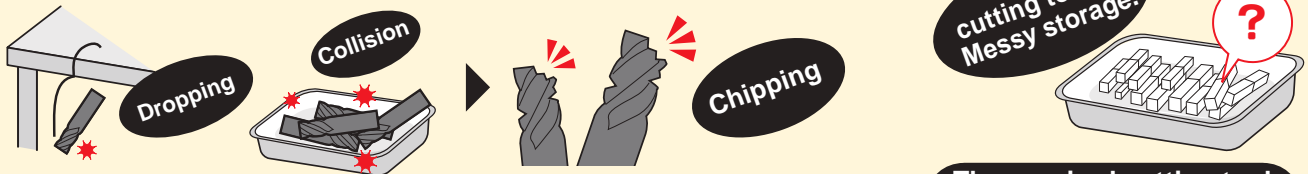
Freely cut to required overall length

Lid for container box

CODE
CN-FT



Are you having trouble storing your cutting tools?

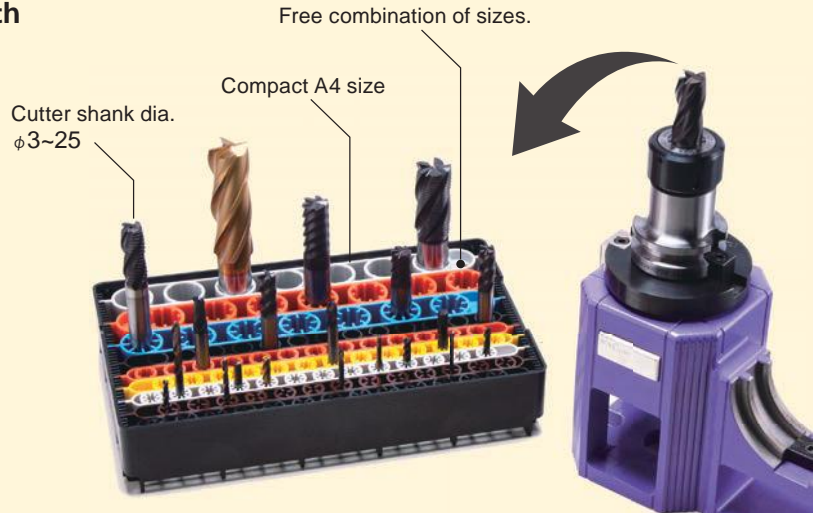
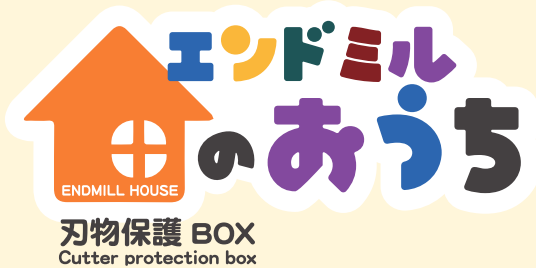


Cutting tool expenses increase due to cutting edge chipping.

Many cutting tools. Messy storage. The required cutting tool cannot be found easily.

Save cutting tool expenses and time with the optimum working environment.

Cutting tool life is extended because the cutting edge is not dulled from striking other cutters. You can find the required cutting tool immediately.



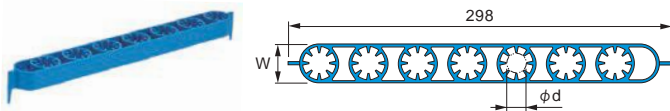
Value set

This is a convenient value set that can be immediately used and handles tool shank diameters of 3 mm to 12 mm. (Stores 156 cutting tools)

Stand		Base		TOOL CAP		TOOL CAP storage box		CODE
Cutter dia	Q'ty	Q'ty		Cutter dia	Q'ty	Q'ty		EMO-SET-01
φ 3	1	1	Stand	φ 3	50	1	φ 3...13 pcs. φ 4...26 pcs. φ 6...39 pcs. φ 8...26 pcs. φ 10...26 pcs. φ 12...26 pcs.	
φ 4	2			φ 4	50			
φ 6	3			φ 6	50			
φ 8	2			φ 8	50			
φ 10	2			φ 10	50			
φ 12	2			φ 12	50			

Stand

Parts for storing and securing cutting tools. It is possible to identify the cutting tool size by color, and the cutting tool you need can be found at a glance. Use this stand inserting it into the base.



CODE	φd	Q'ty	Color	max. Q'ty	W
EMO-STD 3-2	3	2	Black	13 pcs./cutting tools/stand	15mm (1W)
-5		5			
-STD 4-2	4	2	Brown		
-5		5			
-STD 6-2	6	2	Gray		
-5		5			
-STD 8-2	8	2	Yellow		
-5		5			
-STD10-2	10	2	Orange		
-5		5			
-STD12-2	12	2	Black		
-5		5			
-STD16-2	16	2	Blue	7 pcs./cutting tools/stand	30mm (2W)
-5		5			
-STD20-2	20	2	Orange		
-5		5			
-STD25-2	25	2	Gray		
-5		5			

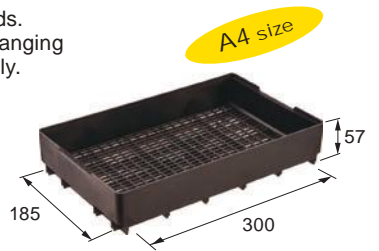
Base

Container for holding the stands. Stands can be arranged by changing the combination of stands freely.

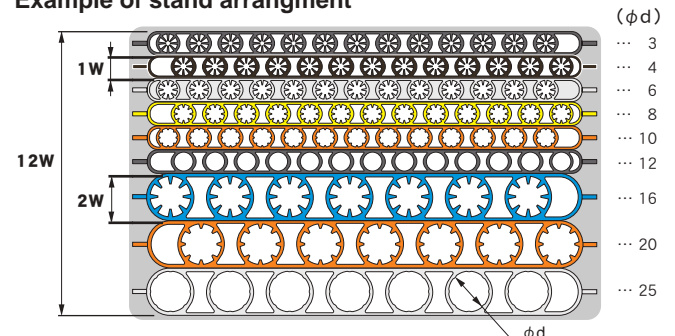
CODE	Q'ty
EMO-BAS-1	1
-3	3

Note

- 12 rows for the stands of 3mm to 12mm diameter or 6 rows for the stands of 16mm to 25mm diameter.
- The left-right orientation of the stands can be set.



Example of stand arrangement



Technical support

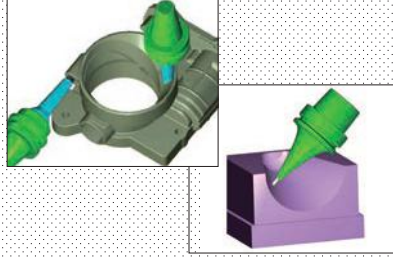
At MST, we provide long-term support of your safe use and maintaining high accuracy of our products for your machining.

1 Pre-sales

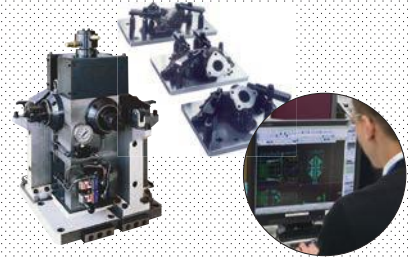
Provide wide-ranging technical support.



Tool selection



Interference check with 3D drawings



Designing manufacturing jig fixtures

2 On delivery

You will receive instructions.



Instructions for a heater



Maintenance instruction

3 Post-sales

Our Tool Clinic experts can visit your factory to demonstrate the correct usage, maintenance and seminar.



Seminar



Evaluation



Consulting

Substantial peripheral equipment

 <p>Work table 6S DESK ➔ P. 107</p>	 <p>Holder, Tool washing machine Clean BOX ➔ P. 107</p>	 <p>Tool protection cover TOOL CAP ➔ P. 108</p>	 <p>Tool tightening stand Tool set up station ➔ P. 109</p>	 <p>Test bar CHECKMATE ➔ P. 111</p>
		 <p>Tool holder storage cabinet ➔ P. 112</p>	 <p>Cutter protection box ENDMILL HOUSE ➔ P. 113</p>	 <p>Cleaning tool ➔ P. 13</p>

Instructions for use

To ensure optimum, trouble-free performance, please read this operation manual carefully before using the unit. Please contact us if your holder is damaged. We are ready to help you.

Instructions for using SLIMLINE

Pay attention to scratches and rust.

Before using, be sure to remove anti-rust oil on the holder. Scratches and dust can reduce performance and accuracy. Please keep your holders clean with rags. Our CLEAN BOX is available for your cleaning needs.

CLEAN BOX
→ P. 107



Tool holder shank

If you insert holder shanks with scratches and dust into machine spindles, the accuracy of the spindle is reduced and the spindle can be damaged. For shank maintenance, use an oil grinding stone or sandpaper to remove scratches and rust. We can not re-grind shanks since it changes the position of gauge line, so we recommend you to purchase new holders.

Storage

Please use tool protection covers if you store holders with cutters. Cutting edges may be damaged by coming in contact with each other, and you may be injured by sharp cutting edges.



TOOL CAP
→ P. 108



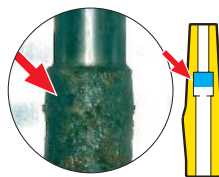
About daily maintenance.

Why does rust form?

- Water in air adheres to SLIMLINE holders. This water reacts with the metal and then rust forms. Since the SLIMLINE is heated, the oil on its surface is liable to evaporate and this makes rusting more likely to occur
- Rust formed on the metal surface gradually corrodes deeper over time.

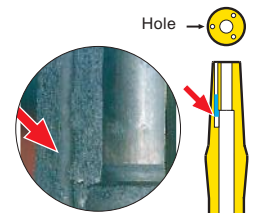
Coolant-through-spindle

In particular, when coolant is passed through a holder or a collet in the spindle-through system, it remains deep inside the holder and induces rusting.



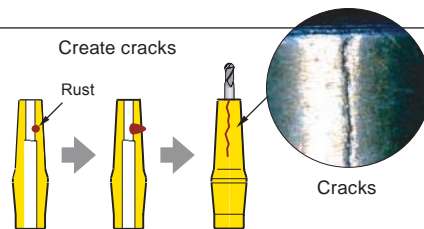
Flush type

Special care must be taken for the flush type SLIMLINE because coolant is more likely to remain in its small holes.

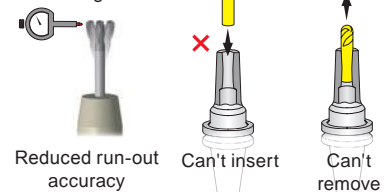


What happens after rusting?

- If a tool is chucked in this state, the tool cannot be inserted into the holder. If the tool is forced, then the stress resulting from the shrink-fit will focus on the corroded part will cause the holder to crack.
- The clamping force is reduced, resulting in cutter slippage and loss of accuracy.



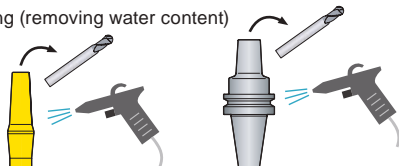
Internal bore distortion of the cutting tool



What should be done to prevent rusting?

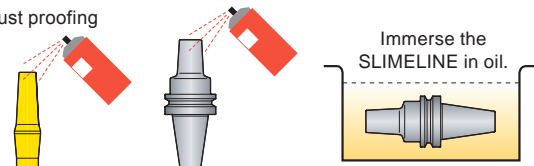
Iron rusting occurs if there are water content and air (oxygen). It can be prevented by removing water content by rustproofing or by ensuring that the metal is not directly exposed to air (oxygen).

1 Cleaning (removing water content)



- After use, blow off any clinging water content with compressed air. Sufficiently blow air, in particular, into the deep ends of holes, small holes in the flush-type SLIMLINE, etc. After SLIMLINE has been cleaned with cleaning oil or a washing machine, blowing the holder with compressed air is effective.
- Heat SLIMLINE with a shrink-fit heater and then remove the cutting tool.

2 Rust proofing



- After cleaning, spray with rustproofing oil or immerse your SLIMLINE in rustproofing oil.
- Prior to shrink-fitting, sufficiently remove the rustproofing oil remaining on the SLIMLINE. To remove the oil, a cleaner spray or solvent is useful.

If it's getting hard to insert the cutting tool ?

If oxidation has occurred, or grease or dust has burned onto the internal bores, remove with "cleaning tool rubber grinding stone".



Cleaning tool
Rubber grinding
stone type
→ P. 13

Precautions for shrink-fitting

Cleaning before shrink-fitting

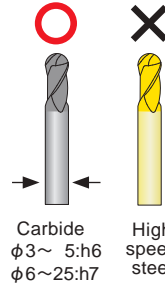
You must clean the cutter shank and internal bore of holder before you shrink-fit it. Please use our brush-type cleaning tool to clean out dust and dirt in before you shrink-fit.



Cleaning tool
Brush type → P. 13

Usable tools

- Please use only carbide cutters.
- No shrink release is possible for any tool using high-speed steel.
- A tool exceeding its tolerance can cause breakage or slippage.
- Sometimes melted particles such as tiny cutting chips on cutter shanks get stuck in clamping holes, and cutters can't be removed. DO NOT remove or insert the cutting tool forcibly, when you cannot remove it, please reheat again.



Carbide $\phi 3 \sim 5:h6$
 $\phi 6 \sim 25:h7$

Cleaning before shrink-fitting

Use these gloves to protect from burns during operation.



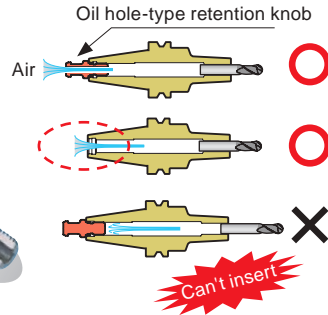
Heat-resistant gloves
→ P. 12

Be careful about burn injury!



Retention knob with hole (BT)

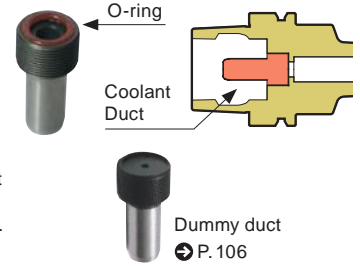
Use a retention knob that has a through hole, or remove the retention knob and heat it. The typical retention knob has no vent to release air which prevents tools from being inserted.



Through hole-type retention knob

Coolant Duct (HSK-A)

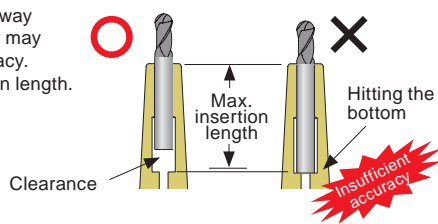
When using the Heat Robo Baby (HRB), remove the coolant duct before heating the holder. When you use hot air heater, remove the coolant duct before heating the holder. If you heat the holder with the coolant duct attached, the O-ring will be damaged. A dummy duct is available. If you don't use the coolant-through feature and don't want to remove the duct every time.



Dummy duct
→ P. 106

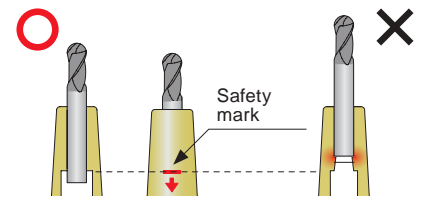
Max. insertion length

Inserting the cutter all the way to the bottom of the holder may result in insufficient accuracy. Please ensure the insertion length.



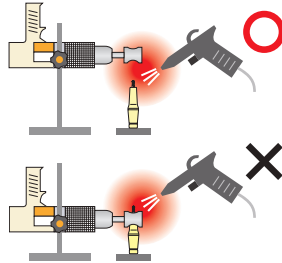
Min. holding length

A short insertion length may cause the holder to be damaged when the cutter is inserted. Always insert the cutter shank beyond the safety mark.



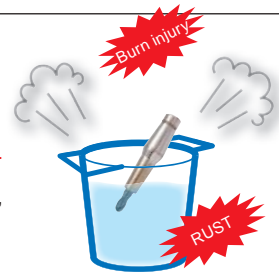
Cooling by outside air

Do not directly apply air to the shrink-fitting heater when cooling the HRB-02S or HRB-01 using air from the outside. The fan in the heater will melt, resulting in a breakdown.



Precautions for water-cooling

Water-cooling immediately after shrink fitting may result in burns due to the large quantity of steam generated. **Be sure to set the shrink-fitting heater setting to COOL and cool the holder for at least one minute before water-cooling.** Moisture left on the holder may lead to rust formation and damage to the holder, so be sure to completely remove all moisture.



2 PIECE type : When the SLIMLINE collet can't be removed from the master holder.

Tap the collet. You can remove the collet after loosening the stuck screw.

- 1 Remove the tool using a shrink-fit heating device.
- 2 Apply force once using the dedicated wrench in the eject direction.
- 3 Tap it.
- 4 Eject
- 5 Apply oil to the thread.



Regular type (CR)
Flush type (CF)

2.25~4

Copper hammer
Copper plate or aluminum plate
Flat, thick steel plate

Slim type (CS)

1.5

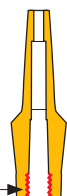
Steel pipe
L=Longer than(M)
C=Longer than($\phi C1$) and smaller than ($\phi 26$)

※Refer to code list for (M) and ($\phi C1$).

ϕC 3~
L
Steel pipe

The reason it cannot be loosened.
In most cases, there is not adequate lubrication of the thread.

Low oil content



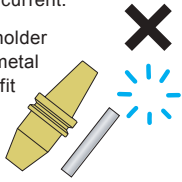
Please contact MST if you cannot remove a collet using the method above.

Cautions to keep in mind when using the HEAT ROBO DENJI! (HRD-01S, HRD-02S)

Only for use with SLIMLINE holders

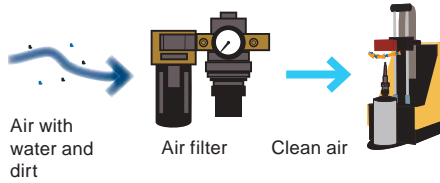
Use of the following items will lead to damage to the heater from excessive current.

- Other brand's shrink-fit holder
- Foreign matter made of metal
- Heating without a shrink-fit holder (blank heating)



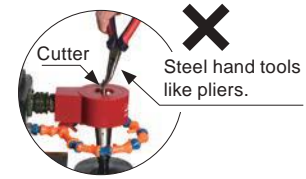
Attaching an air filter

For air-cooling, use filtered air. Air with a lot of water, or hot air, can break air component parts.



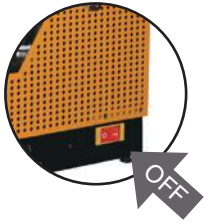
Don't use steel hand tools.

Wear heat-resistant gloves and use a cutter stopper.

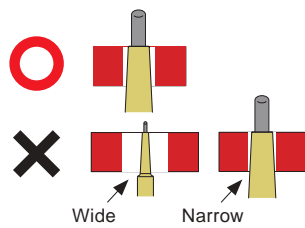


Switching coils...

Be sure to turn off the power

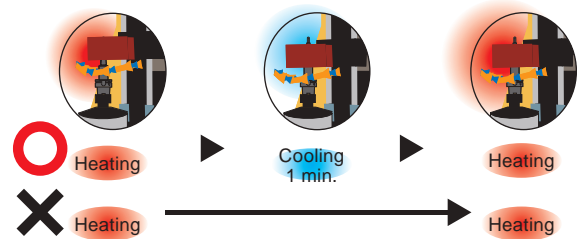


Use the appropriate coil size.

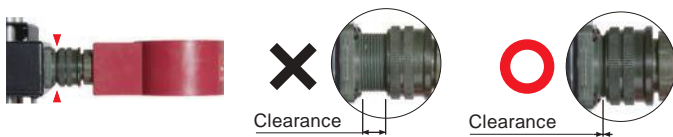


Do not repeat heating.

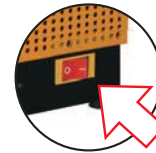
Always conduct a cooling operation for at least one minute after a heating operation, as continuous heating may damage the unit.



When you attach a coil, tighten the threaded connector all the way.



Heating



The HEATROBO DENJI 1200S (HRD-01S) is unable to shrink certain holders.

For the MONO series and STRAIGHT ARBOR, please check for compatibility on item code table before using your holders. For those marked with [▲] on the table, please follow the procedure to the right.

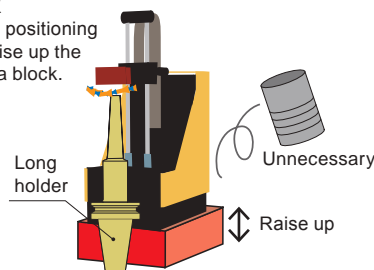
Compatibility table for HRD-01S

[○] Available [-] Not available
[▲] Usable by raising the heating unit. → P.117

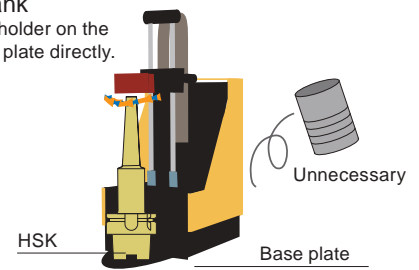
N	G grade	S	
3.3	6.9	4.8	○
11	12.1	14.6	▲

Code list

BT shank
Remove the positioning plate and raise up the heater with a block.

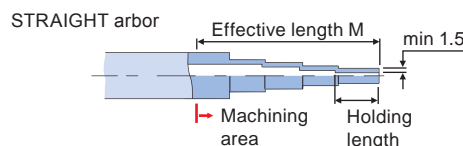
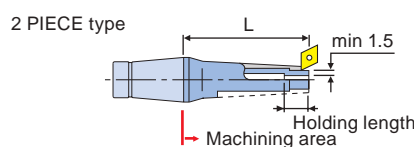
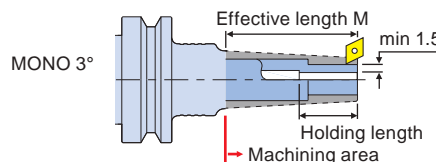


HSK shank
Set up the holder on the positioning plate directly.



User customization (Additional processing)

- Do not change the overall length (tool clamping length).
- Ensure that a thickness of at least 1.5mm is maintained.
- The custom machining area must be above the [▶] mark. Please check details on the code tables.
- You can not do custom machining with the STRAIGHT ARBOR Carbide Shank type.
- When customizing flush-type (CF, SLFA and SLFB) holders, pay particular attention to the coolant-through holes.
- On request, we also supply drawings as CAD data (DXF format), which are useful for additional processing. These drawings may also be used to carry out interference checks with the work-piece and fixtures.
- The rigidity of the holder decreases after custom-machining. Reduce cutting conditions when using it.



About custom-machining (turning)

- Perform light cutting using a shallow cutting depth (0.1 to 0.2mm).
- During cutting, use water-soluble coolant and do not allow the temperature of the object being cut to rise.
- Use a stainless-use tool or positive tip tool.
- The following machining conditions are recommended:
 - Cutting speed ...30~50m/min
 - Feed rate ...0.1~0.2mm/rev
 - Cutting depth ...0.1~0.2mm

Rigidity of SLIMLINE

Relationship between SLIMLINE rigidity S and L/D

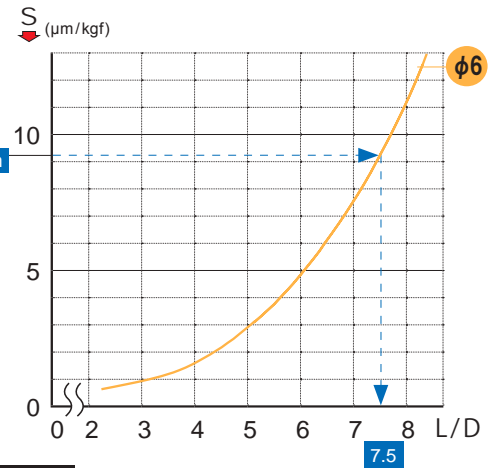
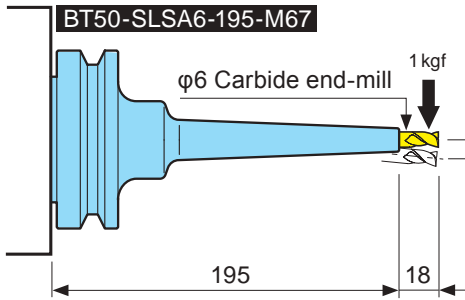
SLIMLINE has a very slim design. Your cutting results may vary significantly, depending on the holder design and the cutting tool projection length.
Rigidity Value S in the dimension tables can be used as a reference mark when selecting holders. Please refer to the example below to learn more about this.

h	Kg	S
165	3.6	9.4
190	3.7	4.4
195	3.8	3.6

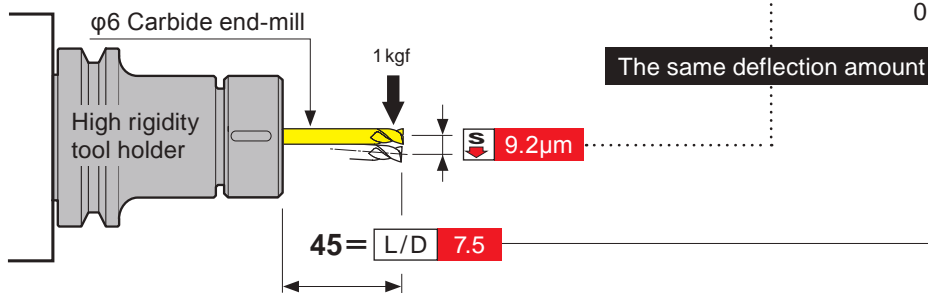
(Code table)

Rigidity Value S is the deflection amount of a holder with a 3D cutter projection length.

① SLIMLINE MONO 3°

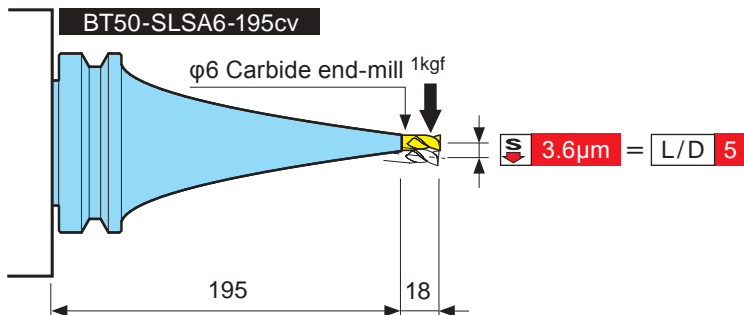


② Convert the S value to the carbide projection length to L/D, which is the cutting parameter criterion.



The rigidity value $S = 9.2\mu\text{m}$ for BT50-SLSA6-195-M67 (18mm cutter projection) is equivalent to $L/D = 7.5 = 45\text{mm}$ of carbide cutter projection.

③ Even if the holder lengths are the same, the rigidity can vary greatly due to differences in the holder design. Selecting the same length MONO Curve BT50-SLSA6-195cv holder will give a rigidity value of $S = 3.6\mu\text{m}$, $L/D = 5$, enabling more stable machining.



SLIMLINE rigidity calculation software

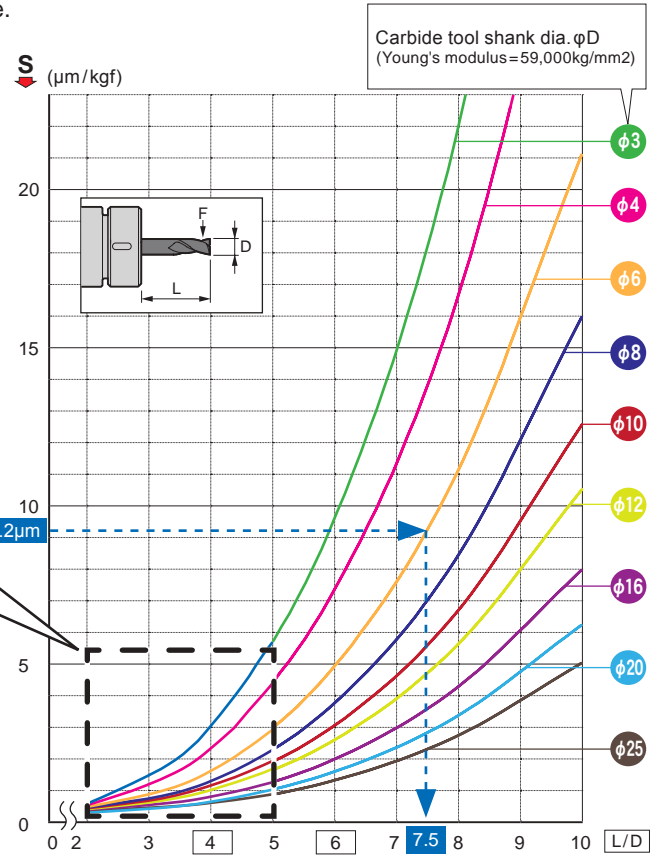
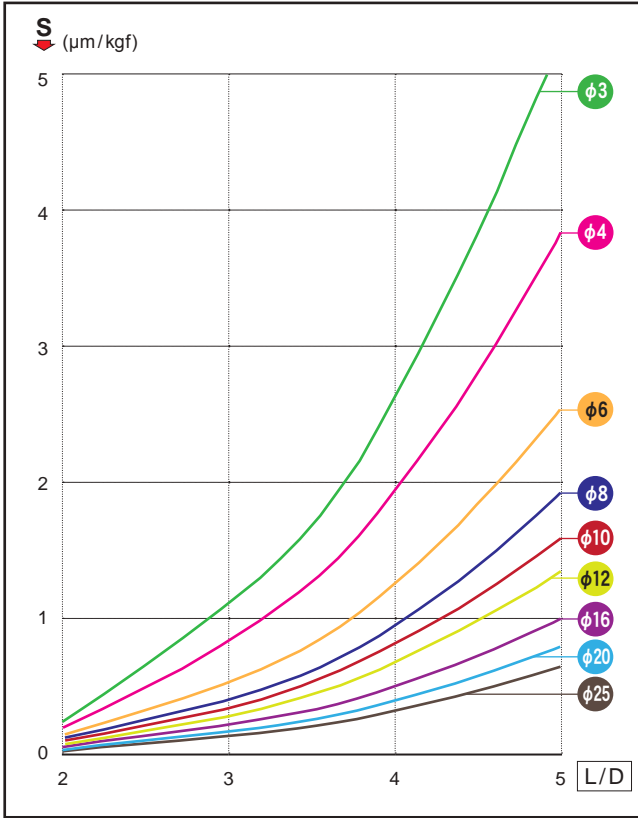
Please use our SLIMLINE rigidity calculation software for different cutter lengths (excluding 3D) and stepped/tapered cutters. It will calculate the rigidity according to your machining conditions.



P. 120

The graph of relationship between rigidity S and L/D

The values of L/D can be determined based on the rigidity S value.



Carbide tool shank dia. ϕD
(Young's modulus = 59,000 kg/mm²)

The formula to determine rigidity S (deflection)

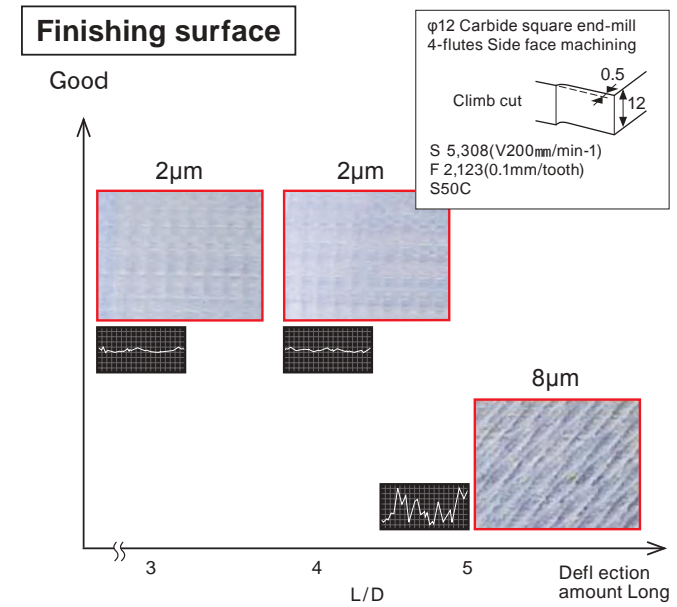
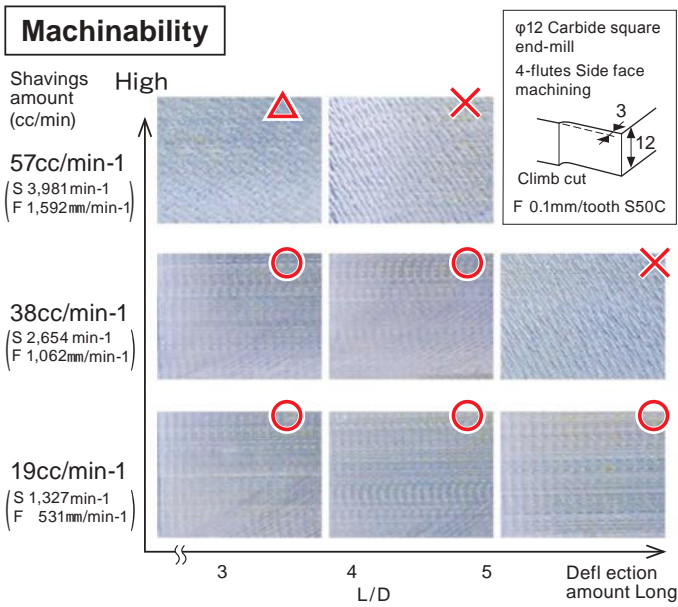
$$S = \frac{6.8 \times F \times L^3}{E \times D^4}$$

D : Tool shank dia.
 L : Overhang length of cutter
 F : Load
 E : Young's modulus

Cutting condition indication

	Cutting condition	
	Standard	Need to consider
Square end-mill	L/D=4 Less than	L/D=4 Over
Corner radius end-mill	L/D=4 Less than	L/D=4 Over
Ball end-mill	L/D=6 Less than	L/D=6 Over

Tool life, surface finishing quality, and productivity comparison by different carbide cutter lengths (L/D)



SLIMLINE Rigidity calculation software

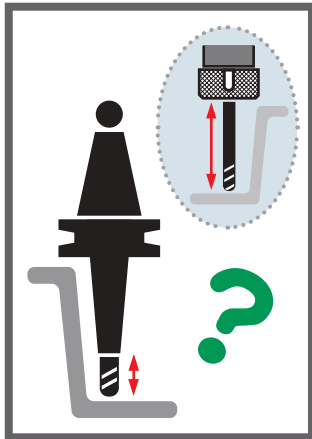


Free of charge

Indispensable for CAM operators!

PAT

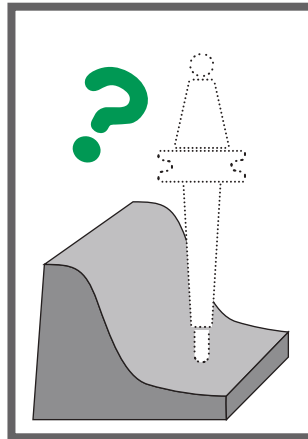
Do you have similar problems?



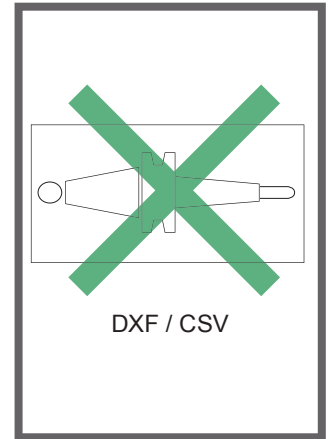
How much more rigidity is there in SLIMLINE compared to conventional holders?



We are looking to find SLIM-LINE products (3,500 Variations) that can be used at even higher cutting conditions.



We want a holder that perfectly matches our cutting conditions and the shape of our workpiece.



There is no drawing data, which makes it troublesome for us to carry out an interference check using CAM.



Use SLIMLINE Rigidity Calculation Software to easily check SLIMLINE rigidity with cutter and work-piece interference. You can select the optimum holder with stronger rigidity and less interference.

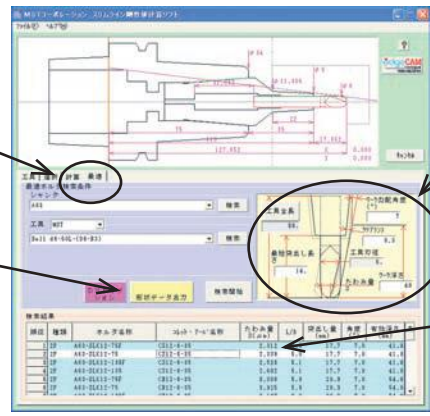


High rigidity

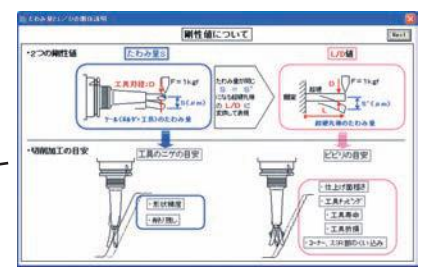
You can readily improve your machining efficiency and quality.

- The most suitable SLIMLINE
- +
- Cutter
- +
- Cutter projection

- ④ Displaying the main dimensions
- ③ The most suitable SLIMLINE holder with the highest rigidity for the shape of the work piece is automatically selected.
- ⑤ "Selected SLIMLINE holder" with optimized "projection" of "cutter" can be output in DXF/CSV.
- ② Holders are listed in order of increasing interference and decreasing rigidity.



① Input a work-piece geometry. Input clearance information (between a work-piece and tool/holder), and tool overhang limitation (min. value).



•The CAM simulators listed below come with SLIMLINE configured data as a standard.

CAM-TOOL CAM-TOOL	edgcam EDGE CAM	worknc WORK NC	hyperMILL HYPER MILL	JIBTA JBM	GENETEC GENETEC	SIEMENS Siemens PLM Software
FF/cam FF/cam	tebis TEBIS	PowerMILL PowerMill	CADmeister CAD meister	VISI VISI	VERICUT VERICUT	

CAUTION : ※Each set of geometry data is handled differently, so please ask each CAM manufacturer for help.

Feature
Shrink-fit Heater
MONO 3°
MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS
Technical data



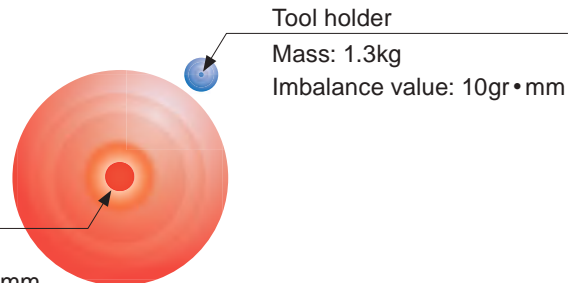
For high-speed spindle rotation

■ Imbalance value of a machine tool spindle and a tool holder

A tool holder imbalance value (G grade) focuses at high-speed spindle rotation of a machining center. However, it is important to consider the entire rotation body, including the spindle, holder and cutter to determine the high-speed spindle rotation. This is because the holder and cutter weight is much lighter than the spindle weight (less than approx. 1/20th), and thus the effect of a tool holder on the spindle rotating equipment (spindle, tool holder and cutter) becomes significantly smaller.



Spindle
Mass: 20kg
Imbalance value: 28gr•mm



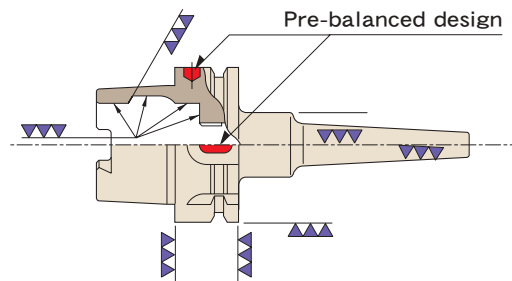
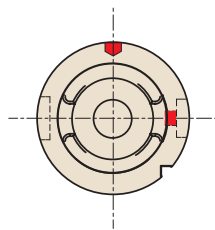
Points to keep in mind at high-speed rotation.

- Minimal length of a tool holder and cutting tool as short as possible.
- Using high accuracy and compact design tool holders.
- Optimizing cutting condition(rpm, feed and depth of cut).

Spending time and money on balance corrections to the holder alone will not result in significant improvement.

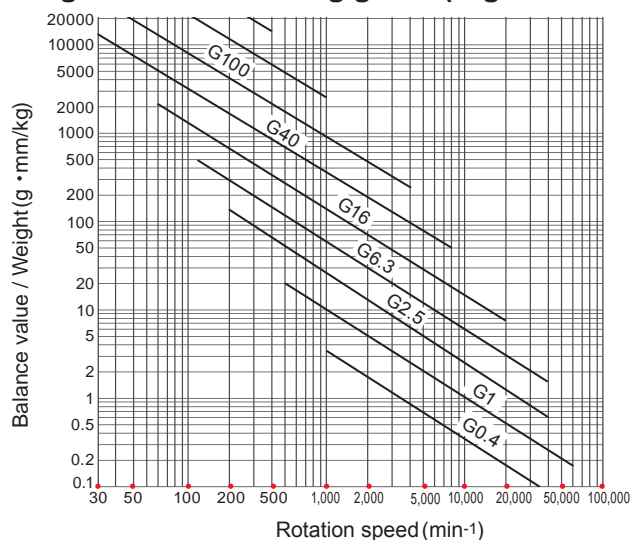
■ PRE-BALANCED DESIGN

MST has applied our original pre-balancing to make our tool holders applicable for high-speed spindle rotation. Balancing corrections for our products is not required.



- Counter-balancing at imbalanced design areas.
- O.D finish grinding after heat treatment

■ Unbalancing in terms of tolerable residual ratio against the balancing grade (G grade value)

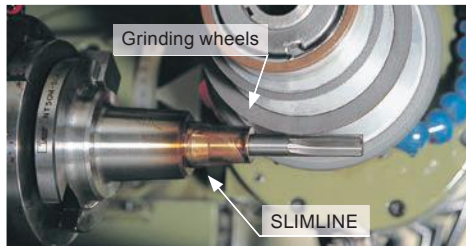
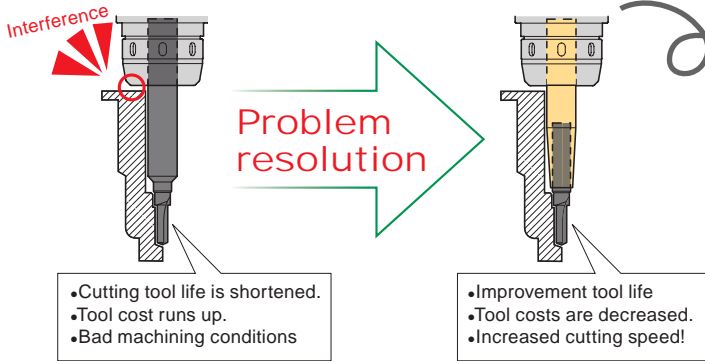


Application example using SLIMLINE

Tool grinding applications

A SLIMLINE holder has a slim design. It does not cause interference with grinding stones. It holds the shorter portion of the tool for regrinding. Grinding can be performed with high accuracy and high rigidity. It reduces tool costs and contributes to cost reduction.

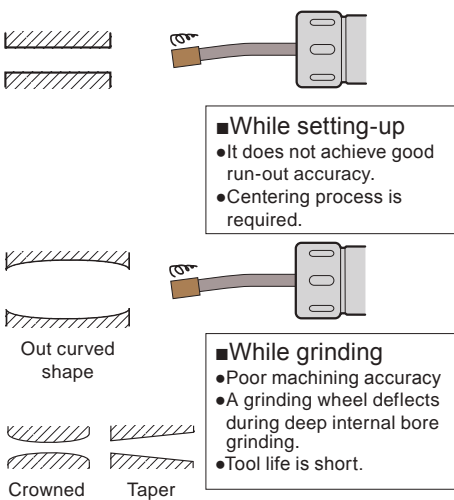
Examples of improvements



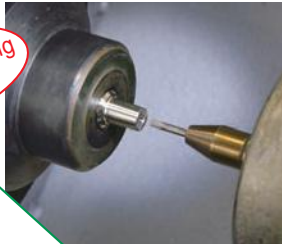
The shrink fit quill for an internal grinder

The chucking accuracy of a grinding stone largely influences grinding accuracy (roundness and surface roughness, etc.). A shrink-fit quill SLIMLINE holder further enhances processing accuracy.

Current method of chucking with a collet



Ideal for internal grinding.



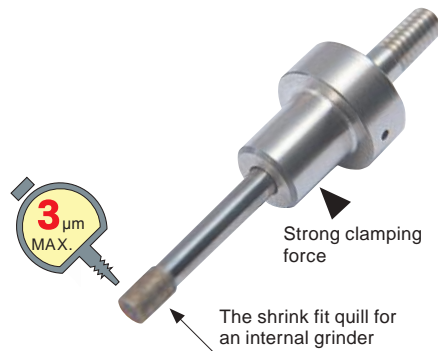
Problem resolution



※Specialized brochure available

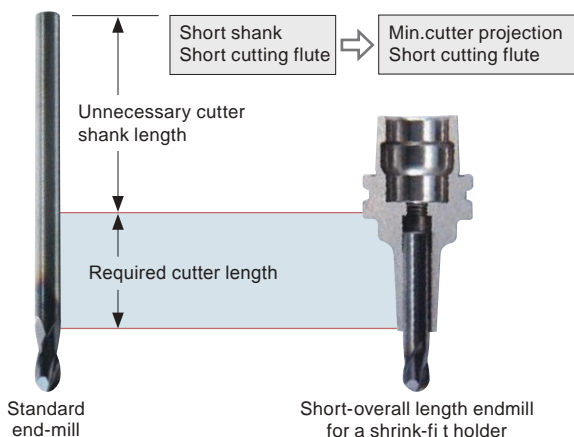
Comparison data

Measurement Items	SLIMLINE	COLLET HOLDER
Roundness	0.3 μm	0.6 μm
Surface roughness	1.38 μm	2.7 μm



Carbide, short-overall length endmill for a shrink-fit holder

With a SLIMLINE, the maximum insertion length is short, so a normal length tool is not necessary.



 DIJET. Super short ball end mill DZ-SSB	 MITSUBISHI MITSUBISHI MATERIALS Impact miracle ball end mill VF-2SSB	 三菱日立ツール Mitsubishi Hitachi Tool Shrink master ball FSHB-TH
 NS TOOL Short shank ball end mill MSB230SF	 Short over all length type WXL end mill WXL-HS-EBD WXL-HS-LN-EBD	 UNION TOOL High-efficiency short shank ball HFB-S

Cutting data

BT40-SLK12-45
CF12-3-55

N : 20000 min⁻¹
F : 2000 mm
V : 25 m
f : 0.05 mm/flute

R0.2 Carbide ball endmill
2flutes

SKD61(HRC50°)

User's voice
Cutter life was extended almost double, because chucking accuracy was improved. Finishing surface of workpiece was improved.

BT40-SLK12-45
CR12-6-55

N : 15000 min⁻¹
F : 2400 mm
V : 188 m
f : 0.04 mm/flute

φ6 Carbide endmill
2flutes

Sintering

Cutter life was extended almost double against a collet holder. Scratch on the cutting surface with up-cut operation has been disappeared due to increasing rigidity of a cutting tool, because of reducing cutter projection when using SLIMLINE.

BT50-SLK12-75
CS12-10-55

N : 6000 min⁻¹
F : 6000 mm
V : 188 m
f : 0.5 mm/flute

R5 Carbide ball endmill
2flutes

SKD11(HRC40°)

We achieved sufficient cutting surface. Cutter life was extended about 3 times against using a collet holder.

A63-SLK12-75
CF12-6-55

N : 16000 min⁻¹
F : 3200 mm
V : 301 m
f : 0.1 mm/flute

R3 Carbide ball endmill
2flutes

S55C(HRC28°)

Cutter life was extended about 3 times due to superior chucking accuracy. SLIMLINE provides us great cutting surface, therefore, we could reduce hand-polishing time.

A63-SLK12-75
CS12-6-80

N : 20000 min⁻¹
F : 4000 mm
V : 377 m
f : 0.1 mm/flute

R3 Carbide ball endmill
2flutes

A7075

No necessity long time for checking interference. Spindle rotation and feed rate were increased 1.5 times. Cutter life was extended due to superior chucking accuracy.

A63-SLK12-75
CF12-10-55

N : 20000 min⁻¹
F : 6000 mm
V : 628 m
f : 0.15 mm/flute

R4 Carbide ball endmill
2flutes

SKD11(HRC50°)

SLIMLINE provides constant run-out accuracy. We achieved sufficient cutting surface, because of vibration free machining due to high rigidity for cross feed. Cutter life was extended 1.5 ~ 2 times against a collet holder.

A63-SLK12-75
CR12-10-55

N : 20000 min⁻¹
F : 6000 mm
V : 628 m
f : 0.15 mm/flute

φ10 Endmill
2flutes

AL

SLIMLINE achieves noise less running at high speed spindle rotation. No required long projection of cutting tool, because SLIMLINE compact design provides us superior approach to cutting point without interference against work clamping devices.

A100-SLK12-105
CR12-4-55

N : 13000 min⁻¹
F : 700 mm
V : 61 m
f : 0.03 mm/flute

φ4 Carbide taper endmill
(1°) 2flutes

HPM7(HRC32°)

Cutter life was extended 2 times against a conventional collet holder due to superior chucking accuracy.

BT40-SLSA6-95-M42

N : 2000 min⁻¹
F : 100 mm
V : 38 m
f : 0.025 mm/flute

φ6 Carbide endmill
2flutes

ADC12

Cutting surface and holding accuracy improved.

BT50-SLRB20-110-M42

N : 4500 min⁻¹
F : 4400 mm
V : 283 m
f : 0.489 mm/flute

R10 Carbide ball endmill
2flutes

Plastic

We doubled the z feeding compared to conventional holder, but this holder still has enough rigidity.

BT40-SLSB12-180-M127

N : 2500 min⁻¹
F : 500 mm
V : 94 m
f : 0.1 mm/flute

R6 Carbide ball endmill
2flutes

Gr

During the cutting process the vibration reduced, and the cutting surface was improved.

BT50-SLSB16-225-M127

N : 5600 min⁻¹
F : 2000 mm
V : 281 m
f : 0.179 mm/flute

φ16 Carbide endmill
2flutes

S55C

Holding accuracy was stabilized. Cutting surface and cutter life improved 2-3 times.

E40-SLRA6-50

N : 20000 min⁻¹
F : 1500 mm
V : 377 m
f : 0.038 mm/flute

R3 Carbide ball endmill
2 flutes

SKD11(HRC60°)

With conventional holder we could not have good surface finish. However with SLIMLINE we could have great surface finish.

F63-SLSA4-75-M22

N : 16000 min⁻¹
F : 1200 mm
V : 100 m
f : 0.038 mm/flute

R1 Carbide ball endmill
2flutes

SKD61(HRC55°)

The cutter life extended because of great accuracy.

A100-CTH25-195
ST25-SLSA6-320

N : 5000 min⁻¹
F : 150 mm
V : 94 m
f : 0.015 mm/flute

Carbide coated endmill
2flutes

P x 5

The rigidity and accuracy of the SLIMLINE system has been improved so that it only requires two components (maste holder and collet) for chucking a cutting tool while conventional systems require three different holders connected in series. The machining time has been reduced to 300 minutes from 360 minutes.

HSK Shank

MST uses DIN-HSK standard shanks, which are widely used in Japan and other countries as “2-face contact tooling” for high-speed, high-efficiency machining.

- The close contact of the end faces (2-face contact) of the HSK shank results in high rigidity for transverse feed, which minimizes vibrations during machining and improves the operating life of the cutting tool and the finished surface precision.
- Even if the spindle expands during high-speed rotations, the tapered hollow portion comes up with that expansion, thereby maintaining high precision.



A type

The most common type in use today.



E type

This type has no drive keyway and is suitable for high-speed machining.



F type

This type uses a combination of different sizes of tapers and flanges.



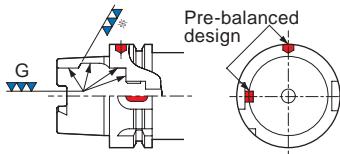
T type

This type is for turning with multiple machining

PRE-BALANCED DESIGN

The HSK-A-type shank is unbalanced in its standard form, but at MST we have applied our original pre-balancing to make this shank applicable for high-speed machining. In the DIN standard, only the area marked with an asterisk (*) is finished in the hollow. In order to further improve the balance, however, MST has carried out finish machining after heat treatment.

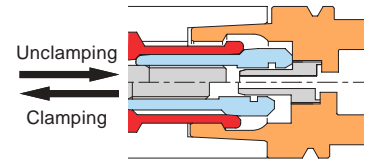
	MST	DIN standard
A 63	15g·mm	75g·mm
A100	28g·mm	170g·mm



Three times stronger clamping force

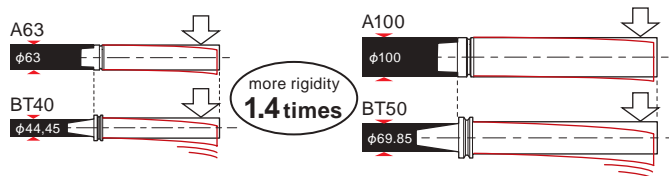
HSK uses a clamping mechanism, which utilizes the wedge effect, to provide a tool gripping power 2.5 to 3.0 times greater than in the pull-stud system (BT40 and BT50), thereby increasing rigidity.

	Tensile strength of draw bar	Tool clamping force
BT40	10~15kN	10~15kN
A63	5.8kN	18.4kN
BT50	20~25kN	20~25kN
A100	14.5kN	45.9kN



RIGIDITY COMPARISON WITH BT SHANK

The HSK shank is effective when longer overhang or higher transverse feed rigidity is required. The higher rigidity greatly contributes to improving the operating life of the cutting tool and the smoothness of the finished surface



TAPER GAUGE

MST establishes the optimal value within the tolerance in accordance with the DIN standard and manufacturers master gauges for tool shanks and those for spindle tapers accordingly.



1/10 taper ring gauge



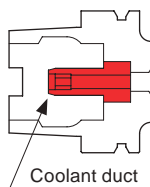
1/10 taper plug gauge



Detection gauge for end face position

COOLANT DUCT

This is a coolant feed part exclusively for the HSK-A type. MST's HSK-A type holder comes standard with each coolant duct.



!
For some machines, the use of a coolant duct (Adjustable) is recommended. The existing coolant duct is replaced with a movable one at your request only when you have placed an order for the holder. For more information on replacement coolant ducts.

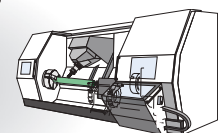
TOOLING SYSTEMS for HSK-T

The HSK-A type is finding increasing use as tooling for turning mills with ATC.



HSK-A Rotating tools

HSK-T Turning tools



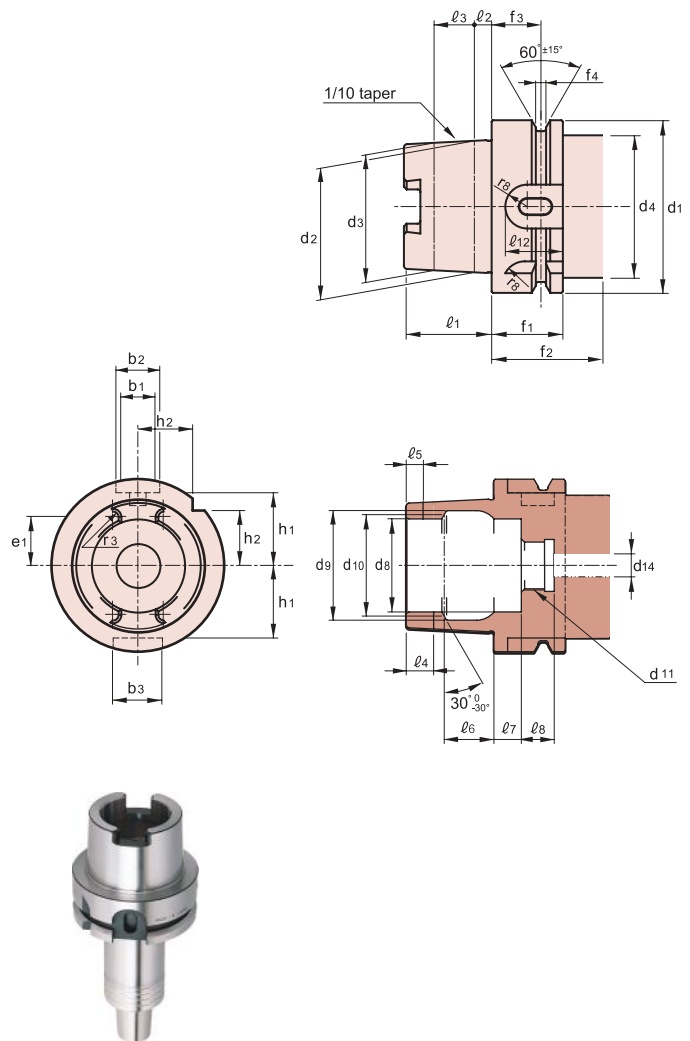
Turning mill machine

Technical data

The shank dimensions

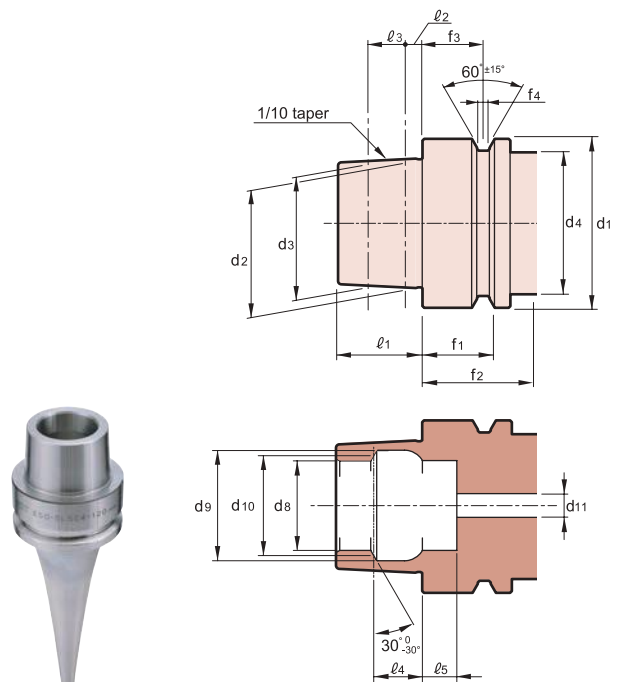
HSK-A (Extracts from DIN 69893-1;1993-07)

Shank	A40	A50	A63	A100	A125
b₁ (H10)	8	10.5	12.5	20	25
b₂ (H10)	9	12	16	20	25
b₃ (H10)	11	14	18	22	28
d₁ (h10)	40	50	63	100	125
d₂	30	38	48	75	95
d₃	+0.007 +0.005	+0.009 +0.006	+0.011 +0.007	+0.015 +0.009	+0.018 +0.011
d₄ (max.)	29.05	36.9	46.53	72.6	91.95
d₈ (H10)	+0.005 +0.003	+0.006 +0.003	+0.007 +0.003	+0.009 +0.003	+0.011 +0.004
d₉ (H11)	34	42	53	85	105
d₁₀	21	26	34	53	67
d₁₁	25.5	32	40	63	80
d₁₄ (max.)	23	29	37	58	73
e₁	M12 × 1	M16 × 1	M18 × 1	M24 × 1.5	M30 × 1.5
f₁ (- ⁰ _{-0.1})	5	6.8	8.4	12	14
f₂ (min.)	10.88	13.797	17.862	27.329	35.324
f₃ (± 0.1)	20	26	26	29	29
f₄ (+ ^{0.15} ₀)	35	42	42	45	45
h₁ (- ⁰ _{-0.2})	16	18	18	20	20
h₂ (- ⁰ _{-0.3})	2	3.75	3.75	3.75	3.75
ℓ₁ (- ⁰ _{-0.2})	17	21	26.5	44	55.5
ℓ₂	12	15.5	20	31.5	39.5
ℓ₃	20	25	32	50	63
ℓ₄ (+ ^{0.2} ₀)	4	5	6.3	10	12.5
ℓ₅ (+ ^{0.2} ₀)	9.5	11	14.7	24	30.5
ℓ₆ (JS10)	6	7.5	10	15	19
ℓ₇ (- ⁰ _{-0.1})	3.5	4.5	6	10	12
ℓ₈ (- ⁰ _{-0.3})	11.42	14.13	18.13	28.56	36.27
ℓ₁₂	8	10	10	12.5	16
r₃ (+ ^{0.05} _{-0.05})	8	10	12	16	18
r₈	12	19	21	24	24
r₃ (+ ^{0.05} _{-0.05})	1.88	2.38	2.88	4.88	5.88
r₈	4.5	6	8	10	5



HSK-E (Extracts from DIN V 69893-5;1996-01)

Shank	E25	E32	E40	E50
d₁ (h10)	25	32	40	50
d₂	19	24	30	38
d₃	+0.006 +0.004	+0.007 +0.005	+0.007 +0.005	+0.009 +0.006
d₄ (max.)	18.15	23.27	29.05	36.90
d₈ (H10)	+0.004 +0.002	+0.005 +0.003	+0.005 +0.003	+0.006 +0.003
d₉ (H11)	20	26	34	42
d₁₀	14	17	21	26
d₁₁ (max.)	16.4	21	25.5	32
ℓ₁ (- ⁰ _{-0.2})	15	19	23	29
ℓ₂	3	4.2	5	6.8
ℓ₃	13	16	20	25
ℓ₄ (JS10)	2.5	3.2	4	5
ℓ₅ (- ⁰ _{-0.1})	8.5	7.3	9.5	11
ℓ₆ (- ⁰ _{-0.1})	7.21	8.92	11.42	14.13
ℓ₇ (- ⁰ _{-0.1})	6	8	8	10
ℓ₈ (min.)	10	20	20	26
ℓ₉ (± 0.1)	20	35	35	42
ℓ₁₀ (+ ^{0.15} ₀)	4.5	16	16	18
ℓ₁₁ (+ ^{0.15} ₀)	2	2	2	3.75

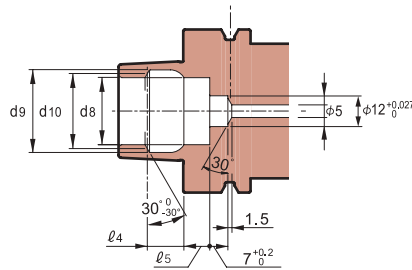
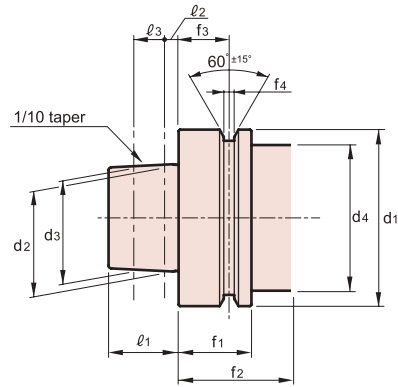


Feature
Shrink-fit Heater
MONO 3° MONO CURVE
MONO Series
2PIECE type
UNO
HYPER VERSION
Z
STRAIGHT arbor
OTHERS
PERIPHERALS

Technical data

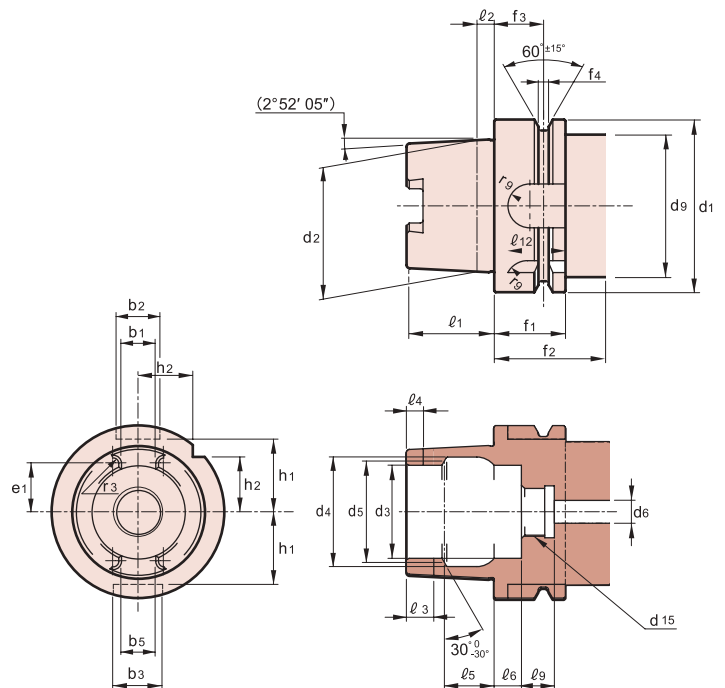
HSK-F (Extracts from DIN V 69893-6;1996-01)

Shank	F63	F80
d₁ (h10)	63	80
d₂	38 +0.009 +0.006	48 +0.011 +0.007
d₃	36.9 +0.006 +0.003	46.53 +0.007 +0.003
d₄ (max.)	53	67
d₈ (H10)	26	34
d₉ (H11)	32	40
d₁₀	29	37
f₁ ($-\frac{0}{-0.1}$)	26	26
f₂ (min.)	42	42
f₃ (± 0.1)	18	18
f₄ ($+\frac{0}{0}^{+0.15}$)	3.75	3.75
ℓ₁ ($-\frac{0}{-0.2}$)	25	32
ℓ₂	5	6.3
ℓ₃	11	14.7
ℓ₄ (Js10)	14.13	18.13
ℓ₅ ($-\frac{0}{-0.1}$)	10	10
f₁ ($-\frac{0}{-0.1}$)	26	26
f₂ (min.)	42	42
f₃ (± 0.1)	18	18
f₄ ($+\frac{0}{0}^{+0.15}$)	3.75	3.75



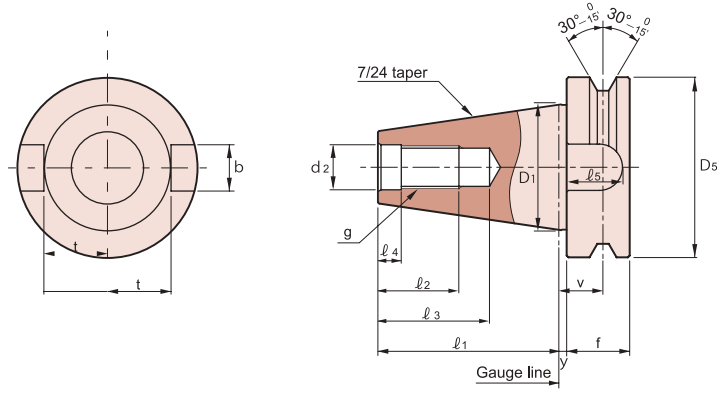
HSK-T (Extracts from ISO 12164-3;2008)

Shank	T40	T50	T63	T100	T125
b₁ ($+\frac{0.03}{-0.03}$)	8.05	10.54	12.54	20.02	25.02
b₂ (H10)	9	12	16	20	25
b₃ (H10)	11	14	18	22	28
b₅	7.932 +0.03 0	10.425	12.425	19.91	24.915
d₁ (h10)	40	50	63	100	125
d₂	30.007	38.009	48.010	75.013	95.016
d₃ (H10)	21	26	34	53	67
d₄ (H11)	25.5	32	40	63	80
d₅	23	29	37	58	73
d₆ (max.)	5	6.8	8.4	12	14
d₉ (max.)	39	49	62	99	124
d₁₅	M12 × 1	M16 × 1	M18 × 1	M24 × 1.5	M30 × 1.5
e₁	11	13.88	17.99	27.37	35.37
f₁ ($-\frac{0}{-0.1}$)	20	26	26	29	29
f₂ (min.)	23	30	30	34	34
f₃ (± 0.1)	16	18	18	20	20
f₄ ($+\frac{0}{0}^{+0.15}$)	2	3.75	3.75	3.75	3.75
h₁ ($-\frac{0}{-0.2}$)	17	21	26.5	44	55.5
h₂ ($-\frac{0}{-0.2}$)	12	15.5	20	31.5	39.5
ℓ₁ ($-\frac{0}{-0.2}$)	20	25	32	50	63
ℓ₂	4	5	6.3	10	12.5
ℓ₃ ($+\frac{0}{0}$)	6	7.5	10	15	19
ℓ₄ ($+\frac{0}{0}$)	3.5	4.5	6	10	12
ℓ₅ (JS10)	11.42	14.13	18.13	28.56	36.27
ℓ₆ ($-\frac{0}{-0.1}$)	8	10	10	12.5	16
ℓ₉ ($-\frac{0}{-0.1}$)	8	10	12	16	18
ℓ₁₂	12	19	21	24	24
r₃ ($+\frac{0}{-0.05}$)	1.88	2.38	2.88	4.88	5.88
r₉	4.5	6	8	10	5



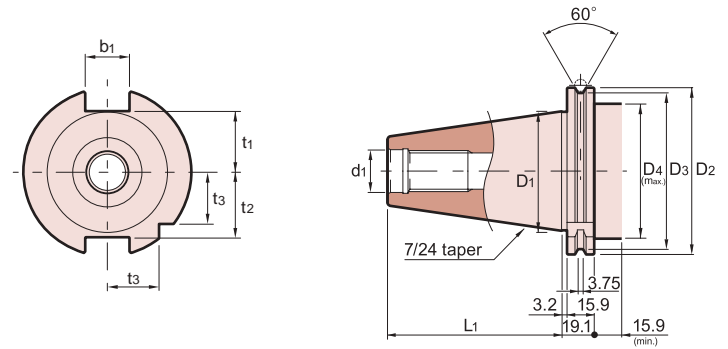
BT (Extracts from MAS 403)

Shank	BT30	BT40	BT50
D1	31.75	44.45	69.85
ℓ₁ (± 0.15)	48.4	65.4	101.8
d₂ (H8)	12.5	17	25
g (6H)	M12	M16	M24
ℓ₂ (min.)	24	30	45
ℓ₃ (min.)	34	43	62
ℓ₄	7	9	13
b (H12)	16.1	16.1	25.7
ℓ₅ (min.)	17	21	31
t (− ⁰ / _{0.2})	16.3	22.6	35.4
D₅ (h8)	46	63	100
f	20	25	35
v (± 0.1)	13.6	16.6	23.2
y (± 0.4)	2	2	3



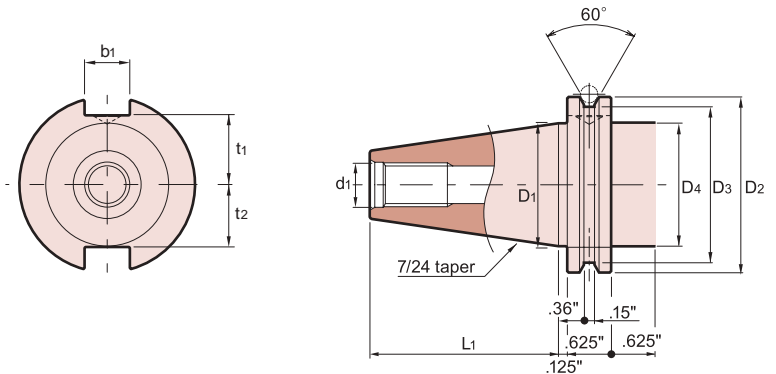
DIN (DIN69871-1)

Shank	BT30	DN50
D1	44.45	69.85
D2	63.55	97.5
D3	56.25	91.25
D4	50	80
L1	68.4	101.75
L3	3.75	6.495
b1	16.1	25.7
d1	17	25
t1	22.8	35.5
t2	25	37.7
t3	18.5	30



CAT.

Shank	BT30	CT50
D1	1.75"	2.75"
D2	2.5"	3.88"
D3	2.22"	3.59"
D4	1.75"	2.75"
L1	2.69"	4"
b1	.65"	1.06"
d1	.64"	1.03"
t1	.99"	1.49"
t2	.59"	1.39"



Dimensional tolerance of typically used mating

The class of dimension(mm)		The tolerance of the hole dimension(μm)						The tolerance of the shaft dimension(μm)					
More than	Less than	H4	H5	H6	H7	H8	H9	h4	h5	h6	h7	h8	h9
—	3	+3 0	+4 0	+6 0	+10 0	+14 0	+25 0	0 -3	0 -4	0 -6	0 -10	0 -14	0 -25
3	6	+4 0	+5 0	+8 0	+12 0	+18 0	+30 0	0 -4	0 -5	0 -8	0 -12	0 -18	0 -30
6	10	+4 0	+6 0	+9 0	+15 0	+22 0	+36 0	0 -4	0 -6	0 -9	0 -15	0 -22	0 -36
10	18	+5 0	+8 0	+11 0	+18 0	+27 0	+43 0	0 -5	0 -8	0 -11	0 -18	0 -27	0 -43
18	30	+6 0	+9 0	+13 0	+21 0	+33 0	+52 0	0 -6	0 -9	0 -13	0 -21	0 -33	0 -52
30	50	+7 0	+11 0	+16 0	+25 0	+39 0	+62 0	0 -7	0 -11	0 -16	0 -25	0 -39	0 -62

Conversion table for International System of Units

Force

N	kgf
1	1.01972 ⁻¹
9.80665	1

Pressure

Pa	kgf/cm ²
1	1.0197 × 10 ⁻⁵
9.80665 × 10 ⁴	1

Stress

Pa	kgf/mm ²
1	1.0197 × 10 ⁻⁷
9.80665 × 10 ⁶	1

OVERSEAS NETWORK

Logistic center (J-COMPO) • USA/Chicago • Germany/Nuremburg • China/Hong Kong • Thai



1608

< Europe >

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TECHNICAL SERVICE TEL 1-800-486-2341
 marketingsarvices@mmus.com FAX 1-847-519-1732

OSG TAP & DIE, INC.**ILLINOIS**

MR. DAN VOLPE TEL 1-630-790-5141
 dan.volpe@osgtool.com FAX 1-630-800-837-3334

SINGLE SOURCE TECHNOLOGIES, INC.**MICHIGAN**

MR. RICK GRABAREK TEL 1-248-232-6268
 rgrabarek@singlesourcetech.com FAX 1-248-232-6261

ILLINOIS

MR. VICTOR ROVEDO TEL 1-847-340-3781
 franz.stark@singlesourcetech.com FAX 1-847-468-1271

WISCONSIN

MR. BILL SCHROEDER TEL 1-262-212-3825
 bill.schroeder@singlesourcetech.com FAX 1-262-574-7551

SOUTH CAROLINA

MS. CARA KELSO TEL 1-704-896-6000
 cara.kelso@singlesourcetech.com FAX 1-704-896-6002

ALABAMA

MR. BOB ASH TEL 1-256-301-0040
 bob.ash@singlesourcetech.com FAX 1-256-301-0059

FLORIDA

MR. BEN GUEST TEL 1-321-4463-3567
 ben.guest@singlesourcetech.com

PRECISION TOOLS SERVICE INC.**INDIANA**

MR. PAUL SCHNEPP TEL 1-812-342-1234
 pschnep@ptservice.com FAX 1-812-342-1235

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MR. DAVID TAKAHASHI TEL 1-562-941-2000
 la@tecnaratools.com FAX 1-562-946-0506

NEW YORK

MR. MATT GENOVESE TEL 1-914-428-7292
 la@tecnaratools.com FAX 1-914-428-7481

TOMITA USA INC.**OHIO**

TEL 1-614-873-6509
 FAX 1-614-873-6806

VEGA TOOL CORP..**ILLINOIS**

MR. TADASHI KURASHIMA TEL 1-800-228-2969
 tadashikurashima@vega-tool.com FAX 1-847-882-9056

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 rob.adkins@osgcanada.com FAX 1-905-632-8466

SINGLE SOURCE TECHNOLOGIES, INC.**ONTARIO, Windsor**

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 slesperance@singlesourcetech.com FAX 1-519-737-8939

ONTARIO, Mississauga

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 greg.james@singlesourcetech.com FAX 1-905-565-6886

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 hcampos@ahnsa.com FAX 52-81-8126-1001

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 lortiz@mmcex.com FAX 52-442 221 6134

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MR. TOSHITAKA YOSHIZAKI TEL 52-55-51-19-3363
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SINGLE SOURCE TECHNOLOGIES, de R.L.de C.V.**QUERETARO**

MR. MANUEL RUIZ TEL 52-442-1016000
 manuel.ruiz@singlesourcetech.com FAX 52-442-2531355

YAMZEN MEXICANA SA DE CV**LEON**

MR. GERARDO PLASCENCIA TEL 52-477-3910280
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<South America>

BRAZIL 1 distributor**OSG FERRAMENTAS DE PRECISAO LTDA.****SAN PAULO**

MR. YUJI KONDA TEL 55-11-6190-0900
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New Zealand 2 distributors**HeadlandMT Ltd****Auckland**

TEL 64-2152265

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MS. MARGARET WILLIAMS TEL 64-92745890
 admin@totalcnc.co.nz FAX 64-92745867

<East Asia>

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DIJET INDUSTRIAL CO.,LTD. 黛傑工業株式會社 SHANGHAI 上海 ✉ MR. GAO YONGMING 高永明 TEL 86-21-5058-1698 ✉ dijetsh@yahoo.com.cn FAX 86-21-5058-1699		Dongguan Integrity Precision Machinery Co.,Ltd. 东莞市誠晉精密機械有限公司 DONGGUAN 東莞 ✉ MR. YANG YABIN 楊亞兵 TEL 86-769-82288607 ✉ frank1_yang@126.com FAX 86-769-82288609		DONGGUAN YAJIYA Precision machinery Co., Ltd 東莞八字屋精密機械有限公司 DONGGUAN 東莞 ✉ MR. Jason lee 李忠信 TEL 86-769-8530-7420 ✉ baziwujingmi@163.com FAX 86-769-8530-7470	
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GUANGZHOU 廣州 ✉ MR. YAMASHITA 山下 TEL 86-20-8732-1601 ✉ yamashita@yamazen.com.cn FAX 86-20-8732-1232		TIANJIN 天津 ✉ MR. ESHIRO 江城 TEL 86-22-2840-8710 ✉ eshiro@yamazensh.com FAX 86-22-2840-8712		ZHEJIANG RI JIN CNC TOOLS CO., LTD. 浙江日進數控刀具有限公司 ZHEJIANG 浙江 ✉ MS. YE LI HONG 葉麗紅 TEL 86-576-84232178 ✉ cnrijin15@126.com FAX 86-576-84115612	

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CENTURY TRADING CORPORATION 世紀貿易股份有限公司 TAIPEI 台北 ✉ MR. YAN YUNGTA 顏永達 TEL 886-2-2298-8336 ✉ ytyan@centra.com.tw FAX 886-2-2298-8338			TAIHO TOOL MFG. CO.,LTD. 大實精密工具股份有限公司 KAOSHUNG 高雄 ✉ yung-fengi@mail.taihotool.co.tw TEL 886-7-621-6136 FAX 886-7-621-6140					

KOREA 9 distributors

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✉ kuksung1@unitel.co.kr FAX 82-53-604-0525

DOO REE TRADING CO.,LTD.
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IGPNET CO.,LTD.
주식회사 아이지피넷
SEOUL 서울
MR. KIM MOON KI 김문기 TEL 82-2-2026-5100
✉ mk-kim@igpnet.co.kr FAX 82-2-2026-5101

KAMI CO.,LTD.
SEOUL 서울
MR. YOUNG L. , KIM, PH. D. 김영립 TEL 82-2-6670-4114
✉ info@kami.biz FAX 82-2-6670-4110

MIRAE TECHNO
미래테크노
ANYANG 안양
MR. PARK HO SUNG 박호성 TEL 82-31-479-5301
✉ miraetechno@hanmail.net FAX 82-31-479-5302

NS KOREA
엔에스코리아
ANYANG 안양
MR. BAI JAMES 배성진 TEL 82-31-479-1207
✉ jamesbai@ns-korea.com FAX 82-31-479-1208

OSG KOREA CORPORATION
한국OSG주식회사
DAEGU 대구
MR. JANG JUN YOUNG 장준영 TEL 82-53-589-2054
✉ jjjang1@osg.co.kr FAX 82-53-583-5553

SEJONG M.T
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BUSAN 부산
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✉ sj0989@naver.com FAX 82-51-317-1148

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MR. KIM SUNG JONG 김성종 TEL 82-2-864-1755
✉ sj-kim@yamazenkorea.co.kr FAX 82-2-864-1758

<South Asia>

INDIA 7 distributors

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MR. B.V. SRIDHAR TEL 91-8067419500
✉ sridhar@makino.co.in FAX 91-8067419523
Delhi
MR. SHASHANK TOMAR TEL 91-1244652200
✉ shashankt@makino.co.in FAX 91-1244365217
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✉ info@makino.co.in TEL 91-2138673600
FAX 91-2138673623

ASSOCIATED ENGINEERING SERVICES CO.,LTD.
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MR. N MURALI TEL 91-4423821581
✉ murali@associatedengg.com FAX 91-4423821584
MMC HARDMETAL INDIA PVT. LTD.
BANGALORE
✉ mmcindia@mmc.co.jp TEL 91-802308-3400

Orion Innotech Pvt. Limited
GURGAON
MR. VISHAL VERMA TEL 91-1244225210
✉ vishal@oriongroup.in FAX 91-1244225211

OSG (INDIA) PVT. LTD.
GURGAON
TEL 91-1244009737
FAX 91-1244207761

VALIANT INDIA
PUNE
MR. VIRENDRA MAYNALE TEL 91-9371672785
✉ sales@valiantindia.in

Yamazen Machinery & Tools India Pvt. Ltd.
Bangalore / Chennai / Gurgaon / Pune
✉ tooling@yamazen.in TEL 91-1244605900
FAX 91-1244605921

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MR. STEFANUS DIBYO TEL 62-21-458-77288
✉ tools@javatec.co.id FAX 62-21-458-77289
PT. JAVATEC TRIMITRA MACHINERY
JAKARTA
MR. STEFANUS DIBYO TEL 62-21-4584-9988
✉ jonatan@javatec-machinery.com FAX 62-21-4584-8899

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LAGUNA
MR. SHIN ISHIDA TEL 63-49-508-0892
✉ s.ishida@yamazen.com.ph FAX 63-49-508-0893

PT. RUKUN SEJAHTERA TEKNIK
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MR. HERI RISWANTO TEL 62-21-628-1615
✉ marketing@abrasive-tools.com FAX 62-21-626-5559

PT. YAMAZEN INDONESIA
JAKARTA
MR. MASASHI HAGIHARA TEL 62-21-451-3345
✉ hagihara@yamazen.co.id FAX 62-21-451-3346

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LAGUNA
MR. TAKAHIRO FUNAKUBO TEL 63-49-508-3912
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A-TECH MARKETING PTE LTD
MR. IAN SOH TEL 65-6773-3148
✉ iansoh@a-tech.com.sg FAX 65-6234-4826
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MR. V.M KUMAR TEL 65-6861-5722
✉ kumar@makino.com.sg FAX 65-6861-1600

NOBEL TECH PTE LTD
MR. ERIC CHAN TEL 65-6749-3636
✉ eric@nbel.com.sg FAX 65-6749-0303

OSG ASIA PTE LTD.
MR. KAZUMASA KOIKE TEL 65-68444350
✉ osgkk@osgasia.com.sg FAX 65-68444351
YAMAZEN (SINGAPORE) PTE LTD.
MR. TAKURO MATSUI TEL 65-6276-9488
✉ matsui@yamazen.com.sg FAX 65-6276-9688

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FACTORY MAX CO.,LTD.
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MAKINO (THAILAND) CO.,LTD.
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MR. JUNYA YOSHIMURA TEL 66-2-971-5750
✉ junya.yoshimura@makino.co.th FAX 66-2-971-5751

OSG (THAILAND) CO.,LTD.
BANGKOK
MR. MASAKAZU SEIKE TEL 66-3-898-9035
✉ mseike@osg.co.th FAX 66-3-898-9042

PRECISION TOOLS SERVICE (THAILAND) CO.,LTD.
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MR. YOSHIKI KATO TEL 66-2-308-2470
✉ sales@ptsthai.com FAX 66-2-308-2471
YAMAZEN (THAILAND) CO.,LTD.
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MR. KENICHI YASUNO TEL 66-2-374-5522
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VIETNAM 2 distributors

KAMOGAWA VIETNAM CO.,LTD
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MR. TOMOHIRO YAMAMOTO TEL 84-4-378-550-22/23
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MR. SHINJI KUSUMOTO TEL 84-8-3910-5477
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YAMAZEN VIETNAM CO.,LTD
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MALAYSIA 2 distributors

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✉ kato@yamazen.com.my FAX 60-3-5569-5011
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超精密級 5μm

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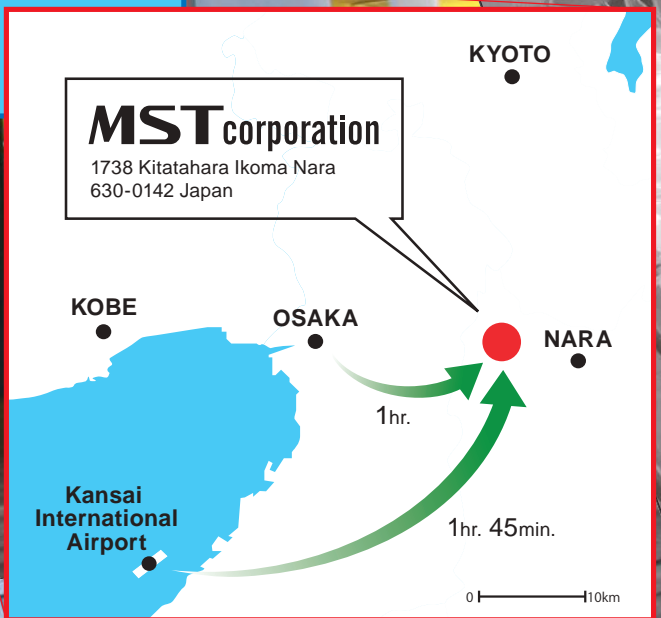
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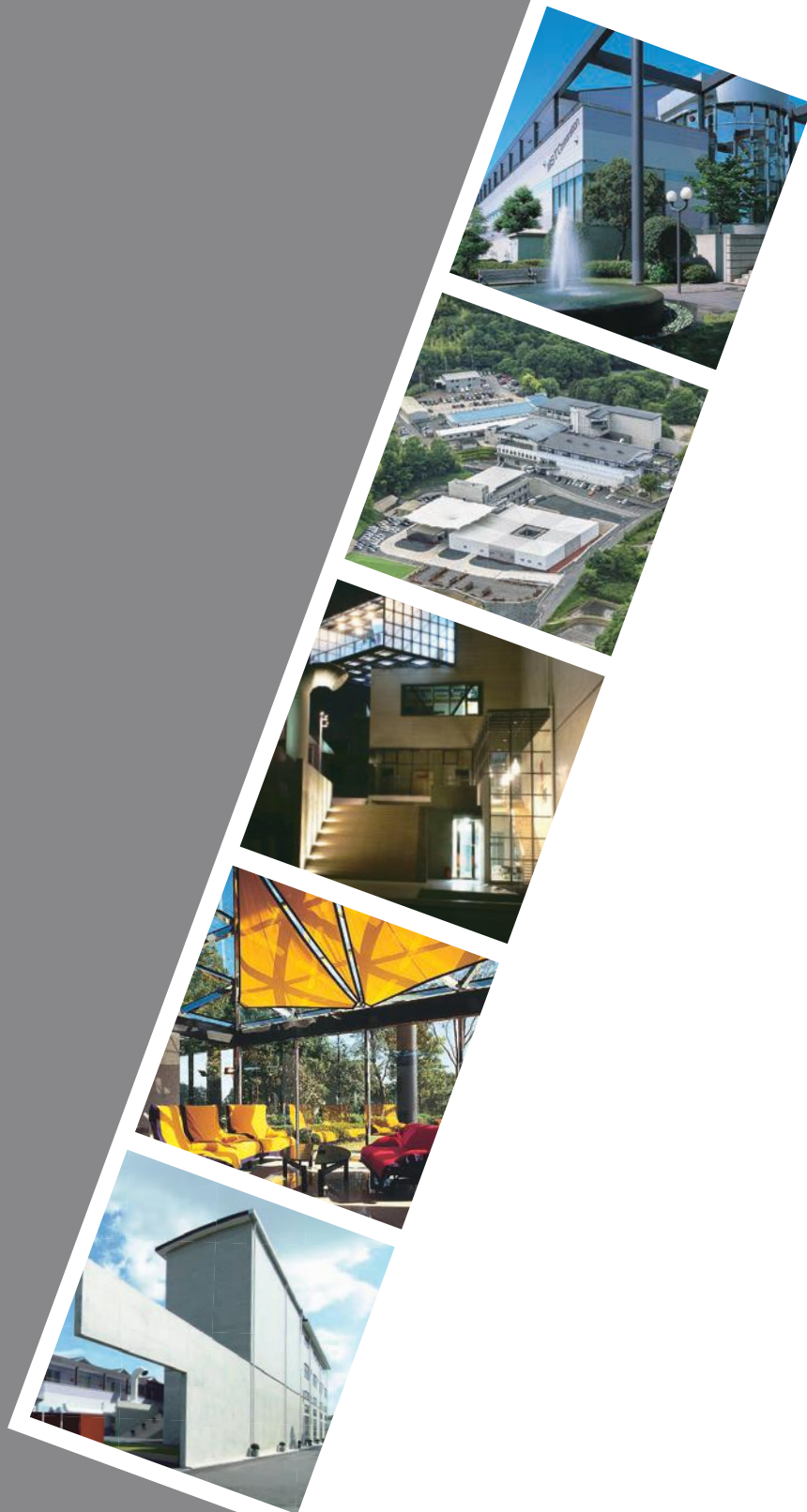
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