PARTS

Wrench · Spanner

Fig. 1

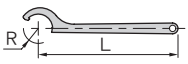


Fig. 2

Fig. 3

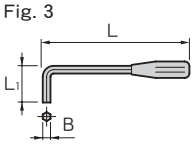


Fig. 4

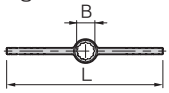
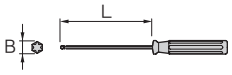


Fig. 5

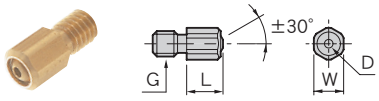


CODE	Fig.	L	R	B	L_1	Holder type
DW-2.5-110	5	110	—	2.5	—	DTB 3
F - 22	1	110	22	—	—	DTA 3
- 38		148.5	19			DTA 7
- 45		225	22.5			DTA12
FC- 32	1	120	16	—	—	CTH10(A40, E32, E40), HUD, HUA10, AHU10, HUT4
- 36		208	18			CTA10, CTH10
- 50		281	25			CTA20, CTH20
- 55		284	27.5			CTH25(A40)
- 62		312	31			CTA25, CTH25
- 74		364	37			CTA32, CTH32
- 90			45			CTA40
FF- 50	1	165	22.5	—	—	ST32B-FMA25.4
- 60		195	26			ST32B-FMA31.75, ST42B-FMA
FM- 72	1	204	36	—	—	ART32(BT40, A50M, A63, NT40, H50)
- 82		234	41			ART32(BT50, A100, NT50)
- 97		239	48.5			ART42(BT50, A100, NT50)
RC- 26	4	240	—	24	—	CTS10(E32)
TW- 4	2	77	—	4	—	DTB 7(E32)
- 5		153		5		DTB 7
- 6		173		6		DTB12
W -135	3	132.5	—	5	110	SLK12 (SLIMLINE 2PIECE TYPE)
-135 DR						DTB 7 (F63M), DTB12(E40, E50, F63M), DTE7, DTE12
-206		200		6	30	SLZ25
-308		300		8		SLZ32, SLZ42

Adjustable torque wrench

Spanner for torque wrench	Adjustable torque wrench	R	Holder type	Recommended tightening torque
F -38AW	AW-1	19	DTA 7	D7-1.5 : 20N·m D7-2.0～7.0 : 40N·m
-45AW		22.5	DTA12	D12(All sizes) : 70N·m
FC-36AW	AW-1	18	CTA10 / CTH10	C10-2.6～5.0 : 40N·m C10-5.2～5.8 : 50N·m C10-6～10 : 60N·m
-50AW	AW-2	25	CTA20 / CTH20	C20(All sizes) : 120N·m

Nozzle



CODE	L	G	W	ϕD	Holder type	Q'ty
NOZ-M4-12	6.3	M4	4.5	1.2	BT40-ART A63 -ART -SLK	12pcs.
-60						60pcs.
-M6-12	8.5	M6	7	1.8	BT50-ART A100-ART -SLZ	12pcs.
-60						60pcs.

■**Std. Access.**
- Wrench for attachment

■**Caution**
- Four nozzles are necessary for one tool holder.

Nut (For collet holder)

Fig. 1

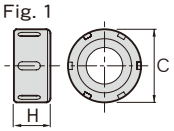


Fig. 2

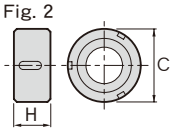
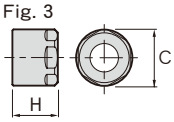
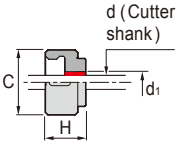


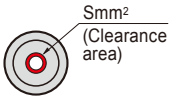
Fig. 3



CODE	Fig.	ϕC	H	Holder type
NUA-CTA10	1	36	18	CTA10, AHB10
-CTA20		50	25	CTA20, AHA20, AHU20
-CTA25		62	28.5	CTA25, AHA25
-CTA32		74	32	CTA32
-CTA40		90	36	CTA40
-CTH10	2	36	18	CTH10
-CTH20		50	25	CTH20
-CTH25		62	28.5	CTH25
-CTH25-55		55		CTH25 (A40)
-CTH32		74	32	CTH32
-CTH10-32		32	18	CTH10 (A40, E32, E40), AHU10
-CTS10	3	26	21	CTS10

Sukima nut (For collet holder)





CODE	ϕC	H	ϕd	ϕd1	S	Holder type
NUB-CTH10- 3.6	36	23	3	3.6	3.1	CTH10
- 4.5			4	4.5	3.3	
- 5.5			5	5.5	3.7	
- 6.4			6	6.4	3.9	
- 8.4			8	8.4	4.6	
-10.3			10	10.3	4.8	
-CTH20- 6.4	50	30	6	6.4	3.9	CTH20
- 8.4			8	8.4	4.6	
-10.3			10	10.3	4.8	
-12.3			12	12.3		
-16.2			16	16.2	5.1	
-20.2			20	20.2	5.7	
-CTH25-20.2	62	34.5				CTH25
-25.2			25	25.2	5.9	
-CTH32-25.2	74	38				CTH32
-32.1			32	32.1	6.0	

Adjust screw

Fig. 1

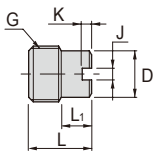
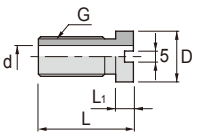


Fig. 2



Use this to adjust the cutter projection length.
※1 BT30 , SE30M, ST25T and ST32T are excluded.
※2 BT40-CTA25-75 is excluded.

CODE	Fig.	L	ϕD	ϕd	L1	J	K	G	Holder type
AJC-M14	1	22	10	-	8	1.5	3	M14×1.5	CTA10 ST25T-CTA20 SE30M -CTA20
-M24		27	20		13	5	4	M24×1.5	CTA20(※1) BT40-CTA25- 75 BT40-CTA32-105
-M28			25					M28×1.5	CTA25(※2)
-M18		24	15		8			M18×1.5	BT30-CTA20, ST32T-CTA20
-M18L	2	43	23						BT50-CTA32, CTA40 BT50-SLZ25, SLZ32, SLZ42
AJN-M18L	2	38	23	10	8	-	-	M18×1.5	BT40-ART32
-M18		63							BT50-ART32, ART42

Coolant duct

Coolant duct (Fixed)

Fig. 1

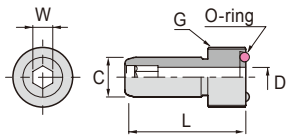


Fig. 2

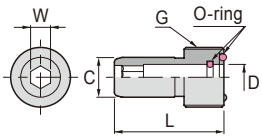
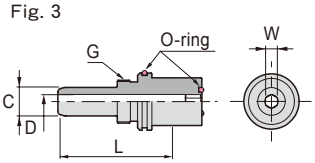


Fig. 3



CODE	Fig.	ϕC	ϕD	L	G	W	Shank type
CD40 -01	1	8	4	29.5	M12×1	4	A40, T40
-03	3			35.5			A40-CTH10-75 A40-CTH25-95
-04				36.5			
CD50 -01	1	10	5	33	M16×1	5	A50, T50
-03	3			39			A50-CTH25-105
-04				59			
CD63 -01	1	12	6	36.5	M18×1	6	A63, T63
-02	2						A63-CTH10-75
-03	3			39.5		5	A63-CTH20-90
-04				60.5			A63-CTH25-105
CD100-01	1	16	8	44	M24×1.5	8	A100, T100
-02	2		10.3				A100-CTH25-135

■Note
- Comes as a standard feature with our holders. However, for the CD50-03 and the CD63-03, CD50-04 and CD63-04 come as options, respectively.

Coolant duct (Adjustable)

Fig. 1

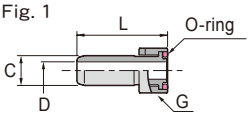
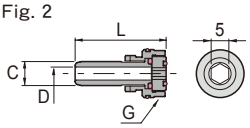


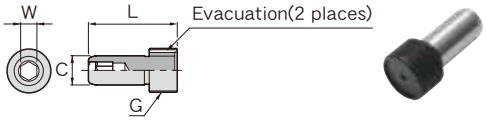
Fig. 2



CODE	Fig.	ϕC	L	ϕD	G	Replaceable coolant duct
CD63 -01F	1	12	36.5	7	M18×1	CD 63-01
-03F	2		45.5	6.5		CD 63-03
CD100-01F	1	16	44	10	M24×1.5	CD100-01

■Note
- For some machines, the use of a coolant duct (Adjustable) is recommended. The existing coolant duct is replaced with an adjustable one at your request only when you have placed an order for the holder.
- If the replacement of the coolant duct is needed after the purchase, use the wrench CD63-01F-RNT.

Dummy duct



CODE	ϕC	L	G	W	Replaceable coolant duct
CD40 -A1	8	29.5	M12×1	4	CD 40-01
CD50 -A1	10	33	M16×1	5	CD 50-01
CD63 -A1	12	36.5	M18×1	6	CD 63-01
CD100-A1	16	44	M24×1.5	8	CD100-01

ANGLE HEAD HALF PARTS LIST

HFD7 / HFT4 (BT30/40/50, A63, DN40/50, CT40/50)

CODE (Master holder)	1 Shank	2 Orientation Ring	8 Washer for intermediate bearing B	9 Intermediate bearing	19 Head
BT30 -HFD7-122	BT30 -FSA-7S	ORR-30	-	-	FBA-7S
-HFT4-122					
-HFD7-182	BT30 -FSA-7L		FZ-7	6804ZZ	FBA-7L
-HFT4-182					
BT40 -HFD7-120	BT40 -FSA-7S	ORR-40	-	-	FBA-7S
-HFT4-120					
-HFD7-180	BT40 -FSA-7L		FZ-7	6804ZZ	FBA-7L
-HFT4-180					
BT50 -HFD7-195	BT50 -FSA-7L	ORR-40			
-HFT4-195					
-HFD7-255	BT50 -FSA-7XL				FBA-7XL
-HFT4-255					
A63 -HFD7-183	A63 -FSA-7L	ORR-40	FZ-7	6804ZZ	FBA-7L
-HFT4-183					
-HFD7-243	A63 -FSA-7XL				FBA-7XL
-HFT4-243					
DN40A-HFD7-135	DN40A-FSA-7S	ORR-40	-	-	FBA-7S
-HFT4-135					
-HFD7-195	DN40A-FSA-7L		FZ-7	6804ZZ	FBA-7L
-HFT4-195					
DN50A-HFD7-195	DN50A-FSA-7L				
-HFT4-195					
-HFD7-255	DN50A-FSA-7XL				FBA-7XL
-HFT4-255					
CT40 -HFD7-135	CT40 -FSA-7S	ORR-40	-	-	FBA-7S
-HFT4-135					
-HFD7-195	CT40 -FSA-7L		FZ-7	6804ZZ	FBA-7L
-HFT4-195					
CT50 -HFD7-195	CT50 -FSA-7L				
-HFT4-195					
-HFD7-255	CT50 -FSA-7XL				FBA-7XL
-HFT4-255					

■**Std. Access.**
- Fixing spanner(KS-23) ● Hexagonal wrench set(W-1550S)
- Single-ended wrench 13mm(SN-13)

※3, 9, 11, 14 and 22 are able to use standard commercial items.

The tools for assembly

Wrench (for shank)

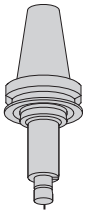
To be used for tightening 11.

CODE
FC-32

Wrench (for head)

To be used for tightening 12 and 13.

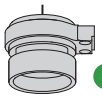
CODE
TSH-HF7



1 Shank

2 Orientation ring

3 Angular bearing CODE 7005ADB



4 Housing CODE FHA-S

5 Dovetail nut CODE FDN-M6

6 Collar A CODE FHC-S

3

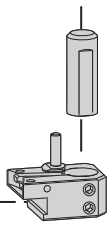
10 Collar F CODE FHC-7F

11 Nut and washer for bearing CODE AN04/AW04

8 Washer for intermediate bearing B

9 Intermediate bearing

7 Drive gear CODE GRI-7



27 Positioning pin

28 Bracket

27 Positioning pin

BT30/40, A63

CODE	Fig.	Pin type	ϕD	L
HP-50S	1	Straight pin	18	50
-50W		Expansion pin		
-50T	3	Taper pin	20	

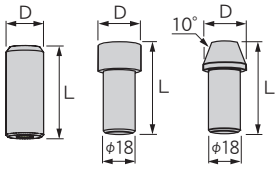
DN40, CT40

HP-62S	1	Straight pin	18	62
-62W		Expansion pin		
-50TL	3	Taper pin	20	65

BT50, DN50, CT50

HP-62S	1	Straight pin	18	62
-62S-20	2		20	
-62W	1	Expansion pin	18	
-62W-20	2		20	
-62T	3	Taper pin	28	

Fig.1 Fig.2 Fig.3



28 Bracket

BT30/40, A63

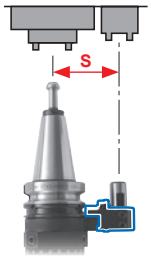
CODE	S
FKA-60	60
-65	65

DN40, CT40

FKA-60-L	60
-65-L	65

BT50, DN50, CT50

FKA- 80	80
- 85	85
-110	110



HFD7

Drill (ϕ1~7)

23 Angle shaft(for drilling) CODE FR-D7L

26 Draw bolt CODE FR-7BL

DETa-1 Collet (D7)→P.8

21 Collar C CODE FBC-7C

19 Head

18 Passive gear CODE GRO-7

16 Collar E CODE FBC-7E

14 Bearing for angle shaft CODE 7903A5

12 Fixation nut for angle shaft CODE FBN-7

HFT4

25 Draw nut and spring CODE FR-T4NS

Tap sleeve (TA4)→P.8

22 Bearing for angle shaft CODE 71804

20 Collar B CODE FBC-7B

※It is already installed in head

17 Collar D CODE FBC-7D

15 Wave washer CODE FWW-7

13 Cover CODE FBK-7

Tap (M2~8)

24 Angle shaft(for tapping) CODE FR-T4

HFD7L / HFA10 / HFT4L (BT30)

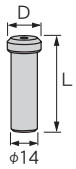
CODE (Master Holder)
BT30-HFD7L-120
-HFA10-120
-HFT4L-120

■**Std. Access.**
- Fixing spanner (KS-23) (HFD7L)
- Hexagonal wrench set (W-1550S)
- Single-ended wrench (SN-13) (HFD7L/HFA10)
- Fook spanner (FC-32) (HFA10)

※3, 4, 9, 15 and 16 are able to use standard commercial items.

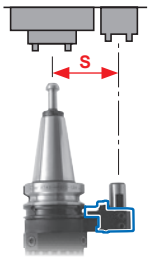
28 Positioning pin

CODE	Pin type	ϕD	L
HP-45S	Straight pin	12	45
HP-E50S	Straight pin	18	50

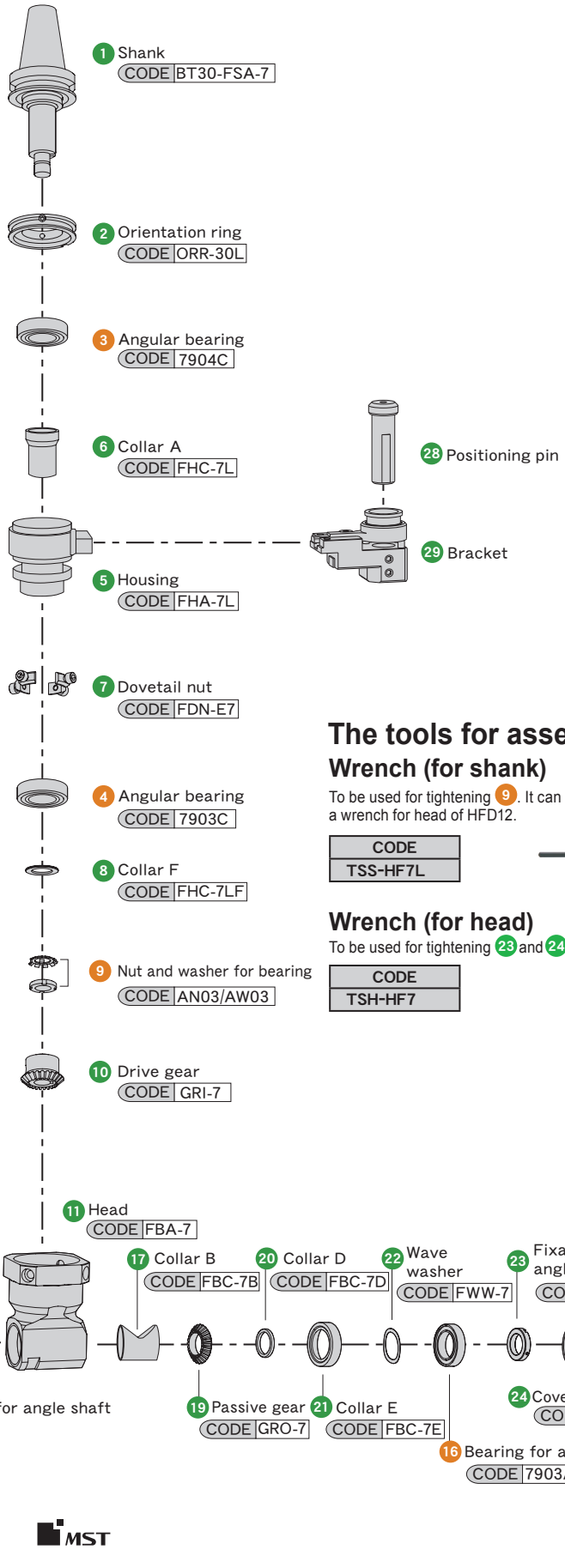


29 Bracket

CODE	S
FKC-50	50
FKC-65	65



■**Note**
- Be sure to use positioning pin (HP-45S) and the bracket (FKC-50) in a combination, and the positioning pin (HP-E50S) and the bracket (FKC-65) in combination.



The tools for assembly

Wrench (for shank)

To be used for tightening 9. It can also be used as a wrench for head of HFD12.

CODE
TSS-HF7L

Wrench (for head)

To be used for tightening 23 and 24.

CODE
TSH-HF7

HFD12 / HFT6 (BT30/40/50, A63, DN40/50, CT40/50)

CODE (Master Holder)	1 Shank	2 Orientation Ring	3 Angular bearing	4 Housing	6 Collar A	7 Collar AXL	8 Intermediate bearing
BT30 -HFD12-122	BT30 -FSA-12S	ORR-30	7005ADB	FHA-S	FHC-S	-	-
-HFT 6-122							
BT40 -HFD12-120	BT40 -FSA-12S	ORR-40					
-HFT 6-120							
-HFD12-180	BT40 -FSA-12L			FHA-L	FHC-L		
-HFT 6-180							
BT50 -HFD12-135	BT50 -FSA-12S			FHA-S	FHC-S		
-HFT 6-135							
-HFD12-195	BT50 -FSA-12L			FHA-L	FHC-L		
-HFT 6-195							
-HFD12-255	BT50 -FSA-12XL		7906A5DB	FHA-XL	FHC-XL1 (※)	FHC-XL2 (※)	6005VV
-HFT 6-255							
A63 -HFD12-123	A63 -FSA-12S	ORR-40	7005ADB	FHA-S	FHC-S	-	-
-HFT 6-123							
-HFD12-183	A63 -FSA-12L			FHA-L	FHC-L		
-HFT 6-183							
-HFD12-243	A63 -FSA-12XL		7906A5DB	FHA-XL	FHC-XL1 (※)	FHC-XL2 (※)	6005VV
-HFT 6-243							
DN40A-HFD12-135	DN40A-FSA-12S	ORR-40	7005ADB	FHA-S	FHC-S	-	-
-HFT 6-135							
-HFD12-195	DN40A-FSA-12L			FHA-L	FHC-L		
-HFT 6-195							
DN50A-HFD12-135	DN50A-FSA-12S			FHA-S	FHC-S		
-HFT 6-135							
-HFD12-195	DN50A-FSA-12L			FHA-L	FHC-L		
-HFT 6-195							
-HFD12-255	DN50A-FSA-12XL		7906A5DB	FHA-XL	FHC-XL1 (※)	FHC-XL2 (※)	6005VV
-HFT 6-255							
CT40 -HFD12-135	CT40 -FSA-12S	ORR-40	7005ADB	FHA-S	FHC-S	-	-
-HFT 6-135							
-HFD12-195	CT40 -FSA-12L			FHA-L	FHC-L		
-HFT 6-195							
CT50 -HFD12-135	CT50 -FSA-12S			FHA-S	FHC-S		
-HFT 6-135							
-HFD12-195	CT50 -FSA-12L			FHA-L	FHC-L		
-HFT 6-195							
-HFD12-255	CT50 -FSA-12XL		7906A5DB	FHA-XL	FHC-XL1 (※)	FHC-XL2 (※)	6005VV
-HFT 6-255							

(※) FHC-XL1/XL2FHC-XL1/XL2 Set 2pcs-each

■**Std. Access.**
- Fixing spanner (KS-30) ● Hexagonal wrench set (W-1550S)
- Single-ended wrench 17mm (SN-17)

※3, 8, 10, 13 and 16 are able to use standard commercial items.

The tools for assembly

Wrench (for shank)

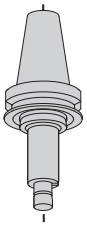
To be used for tightening 10.

CODE
TSS-HF12

Wrench (for head)

To be used for tightening 11 and 12.

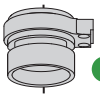
CODE
TSH-HF12



1 Shank

2 Orientation ring

3 Angular bearing



4 Housing

5 Dovetail nut
CODE FDN-M6

6 Collar A

7 Collar AXL

3

8 Intermediate bearing

9 Drive gear
CODE GRI-12

10 Nut and washer for bearing
CODE AN02 AW02

25 Positioning pin

BT30/40, A63

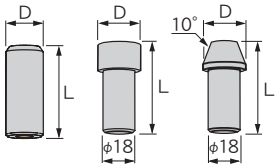
CODE	Fig.	Pin type	φD	L
HP-50S	1	Straight pin	18	50
-50W		Expansion pin		
-50T	3	Taper pin	20	

DN40, CT40

CODE	Fig.	Pin type	φD	L
HP-62S	1	Straight pin	18	62
-62W		Expansion pin		
-50TL	3	Taper pin	20	65

BT50, DN50, CT50

CODE	Fig.	Pin type	φD	L
HP-62S	1	Straight pin	18	62
-62S-20	2		20	
-62W	1	Expansion pin	18	
-62W-20	2		20	
-62T	3	Taper pin	28	



26 Bracket

BT30/40, A63

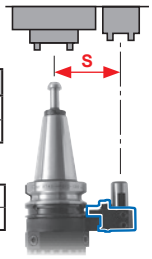
CODE	S
FKA-60	60
-65	65

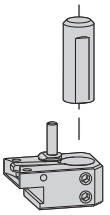
DN40, CT40

FKA-60-L	60
-65-L	65

BT50, DN50, CT50

FKA- 80	80
- 85	85
-110	110





25 Positioning pin

26 Bracket

HFD12

24 Draw bolt
CODE FR-12BL

21 Angle shaft (for drilling)
CODE FR-D12

Drill (φ2.5~13)

DETa-1 Collet(D12)→P.8

HFT6

23 Draw nut and spring
CODE FR-T6NS

Tap sleeve (TA6)→P.8

Tap (M3~12)

22 Angle shaft (for tapping)
CODE FR-T6

16

19 Collar C
CODE FBC-12C

20 Wave washer
CODE FWW-12

18 Collar B
CODE FBC-12B
※It is already installed in head

17 Head
CODE FBA-12

15 Collar D
CODE FBC-12D

16 Bearing for angle shaft
CODE 6805

13 Thrust bearing
CODE 51106

14 Passive gear
CODE GRO-12

11 Fixation nut for angle shaft
CODE FBN-12

12 Cover
CODE FBK-12

HFA20 / HFT12 (BT40/50, A63, DN40/50, CT40/50)

CODE (Master Holder)	① Shank	③ Needle bearing	⑤ Angular bearing	⑥ Collar A	⑦ Housing	⑧ Angular bearing
BT40 -HFA20-135	BT40 -FSA-20S	—	7906A5	FHC-20S	FHA-20S	7905A5
-HFT12-135						
-HFA20-195	BT40 -FSA-20L			FHC-20L	FHA-20L	
-HFT12-195						
BT50 -HFA20-150	BT50 -FSA-20S			FHC-20S	FHA-20S	
-HFT12-150						
-HFA20-210	BT50 -FSA-20L			FHC-20L	FHA-20L	
-HFT12-210						
-HFA20-270	BT50 -FSA-20XL	TAF374720	7905A5DB	FHC-20XL	FHA-20XL	—
-HFT12-270						
A63 -HFA20-198	A63 -FSA-20L	—	7906A5	FHC-20L	FHA-20L	7905A5
-HFT12-198						
-HFA20-258	A63 -FSA-20XL	TAF374720	7905A5DB	FHC-20XL	FHA-20XL	—
-HFT12-258						
DN40A-HFA20-150	DN40A-FSA-20S	-	7906A5	FHC-20S	FHA-20S	7905A5
-HFT12-150						
-HFA20-210	DN40A-FSA-20L			FHC-20L	FHA-20L	
-HFT12-210						
DN50A-HFA20-150	DN50A-FSA-20S			FHC-20S	FHA-20S	
-HFT12-150						
-HFA20-210	DN50A-FSA-20L			FHC-20L	FHA-20L	
-HFT12-210						
-HFA20-270	DN50A-FSA-20XL	TAF374720	7905A5DB	FHC-20XL	FHA-20XL	—
-HFT12-270						
CT40 -HFA20-150	CT40 -FSA-20S	-	7906A5	FHC-20S	FHA-20S	7905A5
-HFT12-150						
-HFA20-210	CT40 -FSA-20L			FHC-20L	FHA-20L	
-HFT12-210						
CT50 -HFA20-150	CT50 -FSA-20S			FHC-20S	FHA-20S	
-HFT12-150						
-HFA20-210	CT50 -FSA-20L			FHC-20L	FHA-20L	
-HFT12-210						
-HFA20-270	CT50 -FSA-20XL	TAF374720	7905A5DB	FHC-20XL	FHA-20XL	—
-HFT12-270						

■**Std. Access.**
- Fixing spanner(KS-41) • Hexagonal wrench set (W-1550S)
- Fook spanner(FC-50) (HFA20)

※3, 5, 8, 16, 18 and 21 are able to use standard commercial items.

The tools for assembly

Wrench (for shank and head)

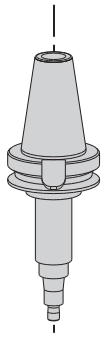
To be used for tightening 11 and 17.

CODE
TS-HA20

Assembling tool for needle bearings

To be used for tightening 21.

CODE
TPN-HA20



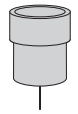
1 Shank

2 Orientation ring
CODE ORR-40

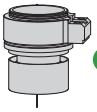
3 Needle bearing(XL)

4 Ring A(XL)
CODE FHR-A

5 Angular bearing



6 Collar A



7 Housing

8 Angular bearing

9 Ring B
CODE FHR-B

10 Drive gear
CODE GR1-20

11 Shank lock nut
CODE FHN-20

12 Dovetail nut
CODE FDN-20

27 Positioning pin

BT40, A63

CODE	Fig.	Pin type	φD	L
HP-50S	1	Straight pin	18	50
-50W		Expansion pin		
-50T	3	Taper pin	20	

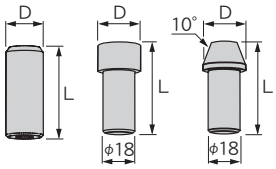
DN40, CT40

HP-62S	1	Straight pin	18	62
-62W		Expansion pin		
-50TL	3	Taper pin	20	65

BT50, DN50, CT50

HP-62S	1	Straight pin	18	62
-62S-20	2		20	
-62W	1	Expansion pin	18	
-62W-20	2		20	
-62T	3	Taper pin	28	

Fig.1 Fig.2 Fig.3



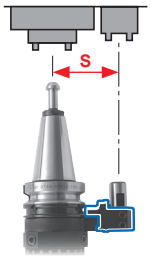
28 Bracket

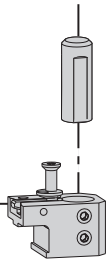
BT40, A63, DN40, CT40

CODE	S
FKB-60	60
-65	65

BT50, DN50, CT50

FKB- 80	80
- 85	85
-110	110





27 Positioning pin

28 Bracket

HFA20

24 Nut
CODE NUA-CTA20

23 Angle shaft(for drilling)
CODE FR-A20

Drill (φ5.8~20)

Endmill (φ5.8~20)

Spring collet (C20)→P.8

20 Collar B
CODE FBC-20B

22 Collar C
CODE FBC-20C

14 Passive gear
CODE GRO-20

16 Deep-groove bearing
CODE 6905

18 Thrust bearing
CODE CRT10-20
※Only for HFA20

HFT12

Tap (M14, 16)

Tap sleeve (TA12)→P.8

25 Angle shaft (for tapping)
CODE FR-T12

Tap (M3~12)

Tap sleeve (TA6)→P.8

21 Needle bearing
CODE TAF324230P6

13 Head
CODE FBA-20

17 Fixation nut for angle shaft
CODE FBN-20

15 Bearing supporter
CODE FBK2-20

19 Cover (for drilling)
CODE FBK-A20

Cover (for tapping)
CODE FBK-T12

26 Draw nut and spring
CODE FR-T12NS

HFCS6 (BT30)

CODE(Master Holder)
BT30-HFCS6-155

■Std. Access.
- Fixing spanner(PS-21)
- Hexagonal wrench set (W-1550S)

※3,7,9,14,15 and 20 are able to use standard commercial items.

The tools for assembly

Wrench (for shank)

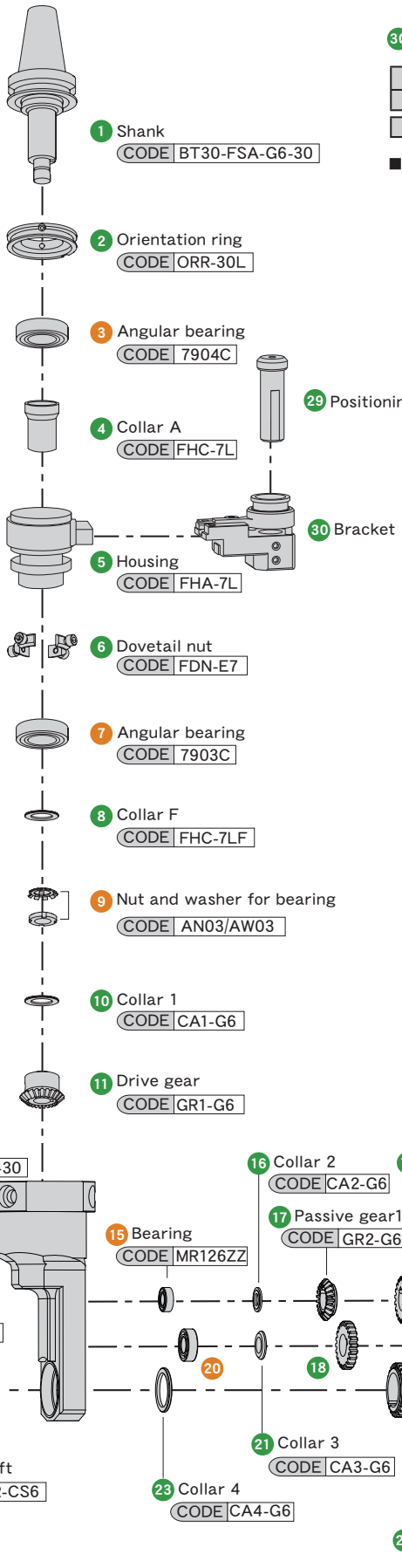
To be used for tightening 9.
It can also be used as a wrench for head of HFD12.

CODE
TSH-HF12

Pliers for Retaining ring

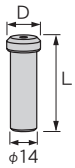
To be used for tightening 28.

CODE
TSH-G6



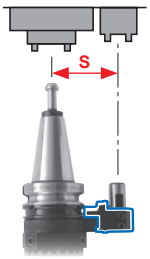
29 Positioning pin

CODE	Pin type	φD	L
HP-45S	Straight pin	12	45
HP-E50S	Straight pin	18	50



30 Bracket

CODE	S
FKC-50	50
FKC-65	65



■Note
- Be sure to use positioning pin (HP-45S) and the bracket (FKC-50) in a combination, and the positioning pin (HP-E50S) and the bracket (FKC-65) in combination.

HFCS6 (BT40/50, DN40/50, CT40/50)

CODE (Master Holder)	1 Shank	11 Head	17 Gear 1	Q'ty	18 Gear 3	20 Bearing	Q'ty	21 Collar 3	Q'ty	22 Idler shaft 2	Q'ty	26 Back plate
BT40 -HFCS6-160	BT40 -FSA-G6	FBA-G6	GR3-G6	2	—	688AZZ1	3	CA3-G6	1	ES2-G6	1	FBP-G6
-205		FBA-G6L		3	GR5-G6		7		3		3	FBP-G6L
BT50 -HFCS6-175	BT50 -FSA-G6	FBA-G6		2	—		3		1		1	FBP-G6
-220		FBA-G6L		3	GR5-G6		7		3		3	FBP-G6L
DN40A-HFCS6-175	DN40A-FSA-G6	FBA-G6	GR3-G6	2	—	688AZZ1	3	CA3-G6	1	ES2-G6	1	FBP-G6
-220		FBA-G6L		3	GR5-G6		7		3		3	FBP-G6L
DN50A-HFCS6-175	DN50A-FSA-G6	FBA-G6		2	—		3		1		1	FBP-G6
-220		FBA-G6L		3	GR5-G6		7		3		3	FBP-G6L
CT40 -HFCS6-175	CT40 -FSA-G6	FBA-G6	GR3-G6	2	—	688AZZ1	3	CA3-G6	1	ES2-G6	1	FBP-G6
-220		FBA-G6L		3	GR5-G6		7		3		3	FBP-G6L
CT50 -HFCS6-175	CT50 -FSA-G6	FBA-G6		2	—		3		1		1	FBP-G6
-220		FBA-G6L		3	GR5-G6		7		3		3	FBP-G6L

■**Std. Access.**
- Fixing spanner (PS-21)
- Hexagonal wrench set (W-1550S)

※3, 8, 13, 14 and 20 are able to use standard commercial items.

29 Positioning pin

BT40

CODE	Fig.	Pin type	ϕD	L
HP-50S	1	Straight pin	18	50
-50W		Expansion pin		
-50T	3	Taper pin	20	

DN40, CT40

HP-62S	1	Straight pin	18	62
-62W		Expansion pin		
-50TL	3	Taper pin	20	65

BT50, DN50, CT50

HP-62S	1	Straight pin	18	62
-62S -20	2		20	
-62W	1	Expansion pin	18	
-62W-20	2		20	
-62T	3	Taper pin	28	

Fig.1

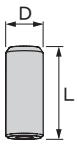


Fig.2

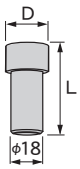
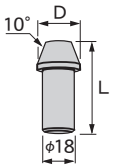


Fig.3



30 Bracket

BT40

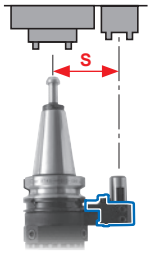
CODE	S
FKA-60	60
-65	65

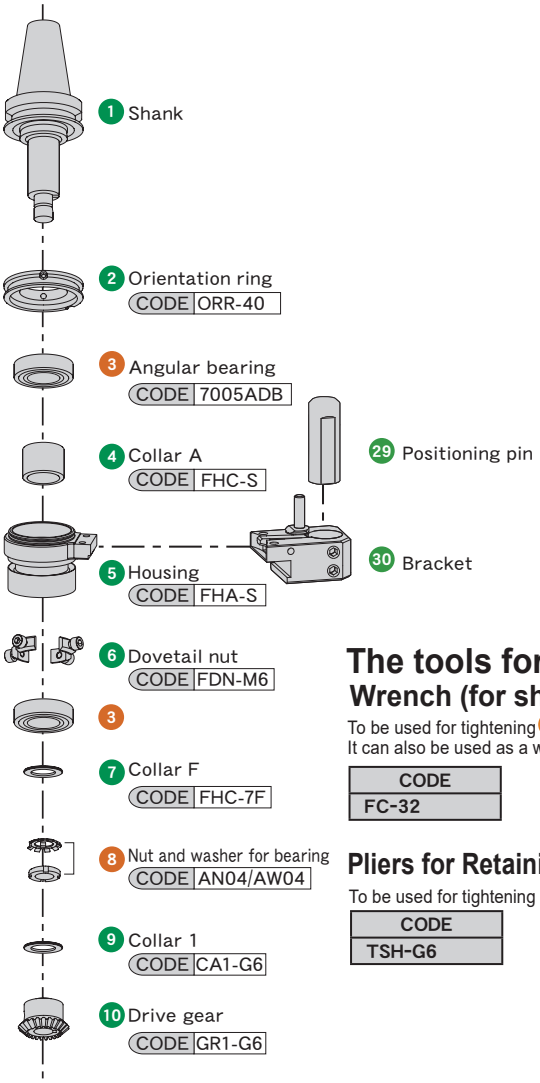
DN40, CT40

FKA-60-L	60
-65-L	65

BT50, DN50, CT50

FKA- 80	80
- 85	85
-110	110





The tools for assembly

Wrench (for shank)

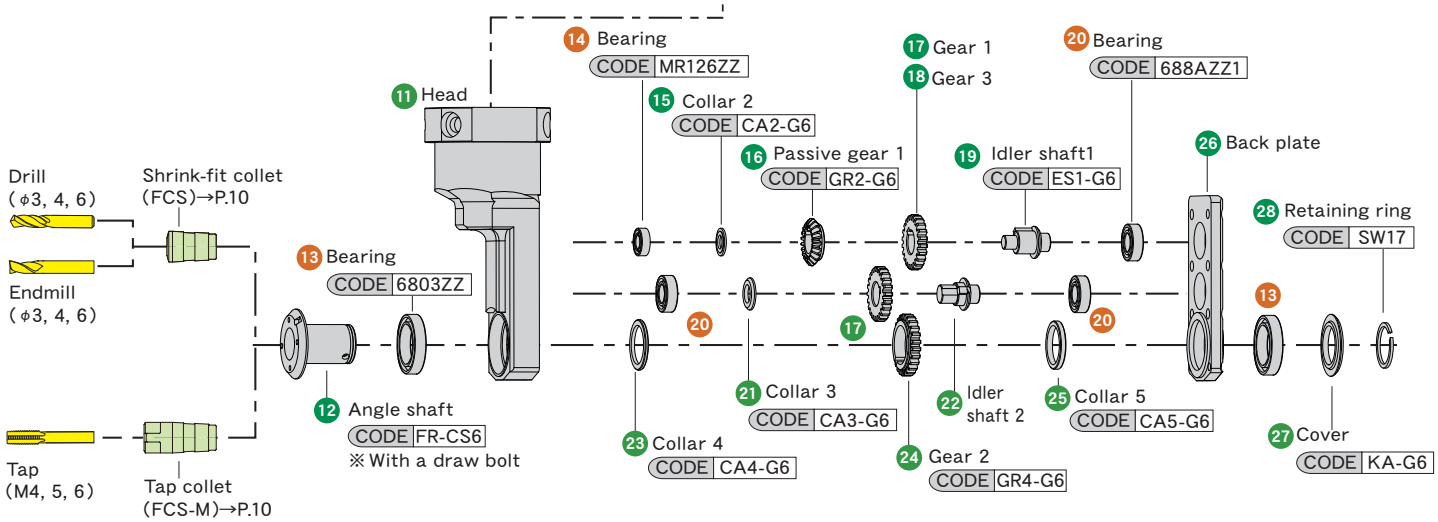
To be used for tightening 8.
It can also be used as a wrench for head of HFD12.

CODE
FC-32

Pliers for Retaining ring

To be used for tightening 28.

CODE
TSH-G6



HUD7 / HUT4 (BT30)

CODE (Master Holder)
BT30-HUD7-102
-HUT4-102

■Std. Access.
- Fixing spanner (KS-23) (HUD7)
- Hexagonal wrench set (W-1550S)

※3, 4, 17, 23 and 30 are able to use standard commercial items.

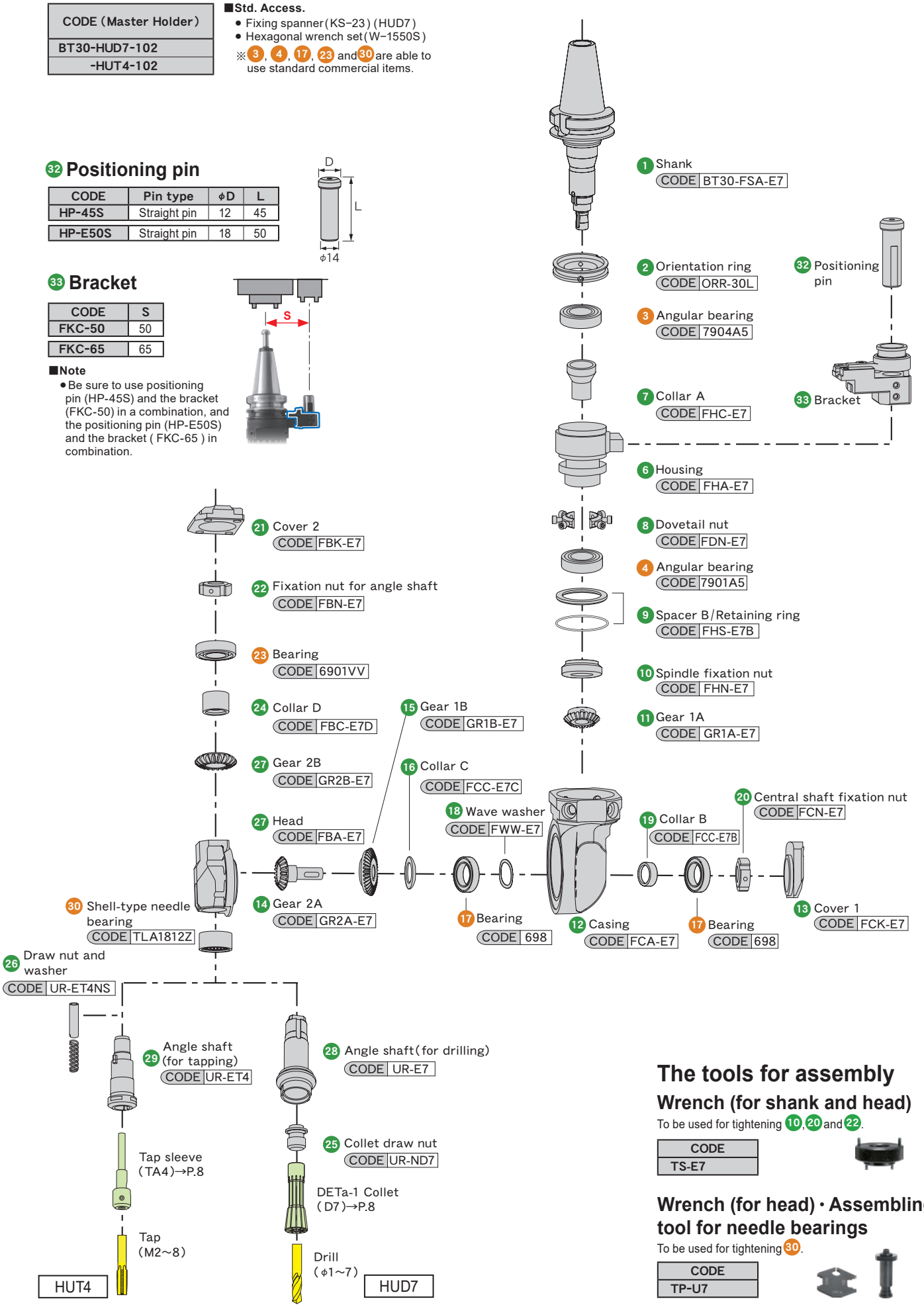
32 Positioning pin

CODE	Pin type	ϕD	L
HP-45S	Straight pin	12	45
HP-E50S	Straight pin	18	50

33 Bracket

CODE	S
FKC-50	50
FKC-65	65

■Note
- Be sure to use positioning pin (HP-45S) and the bracket (FKC-50) in a combination, and the positioning pin (HP-E50S) and the bracket (FKC-65) in combination.



The tools for assembly

Wrench (for shank and head)

To be used for tightening 10, 20 and 22.

CODE
TS-E7

Wrench (for head) · Assembling tool for needle bearings

To be used for tightening 30.

CODE
TP-U7

HUD7 / HUA10 / HUT4 (BT40/50, DN40/50, CT40/50)

CODE (Master Holder)	① Shank
BT40 -HUD 7-135	BT40-FSA-U7
-HUA10-135	
-HUT 4-135	
BT50 -HUD 7-150	BT50-FSA-U7
-HUA10-150	
-HUT 4-150	
DN40A-HUD 7-150	DN40A-FSA-U7
-HUA10-150	
-HUT 4-150	
DN50A-HUD 7-150	DN50A-FSA-U7
-HUA10-150	
-HUT 4-150	
CT40 -HUD 7-150	CT40-FSA-U7
-HUA10-150	
-HUT 4-150	
CT50 -HUD 7-150	CT50-FSA-U7
-HUA10-150	
-HUT 4-150	

■**Std. Access.**
- Fixing spanner(KS-21)
- Hexagonal wrench set (W-1550S)
- Fook spanner(FC-32)(HUA10)

※3, 8, 13, 16, 21 and 27 are able to use standard commercial items.

The tools for assembly

Wrench (for shank)

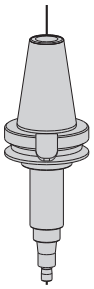
CODE
FC-32

To be used for tightening 8.

Wrench (for head)・Assembling tool for needle bearings

To be used for tightening 16, 22 and 27.

CODE
TP-U7



1 Shank

2 Orientation ring CODE ORR-40

3 Angular bearing CODE 7005ADB

4 Housing CODE FHA-S

5 Dovetail nut CODE FDN-M6

6 Collar A CODE FHC-S

3

7 Collar F CODE FHC-7F

8 Nut and washer for bearing CODE AN04/AW04

9 Gear 1A CODE GR1A-U7

23 Cover 2 CODE FBK-U7

22 Fixation nut for angle shaft CODE FBN-U7

21 Angular bearing CODE 7901A5DB

34 Positioning pin

BT40

CODE	Fig.	Pin type	ϕD	L
HP-50S	1	Straight pin	18	50
-50W		Expansion pin		
-50T	3	Taper pin	20	

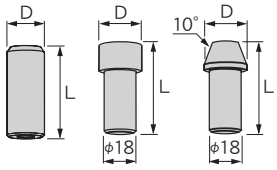
DN40, CT40

CODE	Fig.	Pin type	ϕD	L
HP-62S	1	Straight pin	18	62
-62W		Expansion pin		
-50TL	3	Taper pin	20	65

BT50, DN50, CT50

CODE	Fig.	Pin type	ϕD	L
HP-62S	1	Straight pin	18	62
-62S-20	2		20	
-62W	1	Expansion pin	18	
-62W-20	2		20	
-62T	3	Taper pin	28	

Fig.1 Fig.2 Fig.3



35 Bracket

BT40

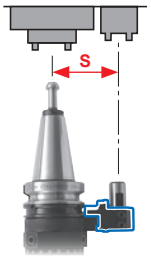
CODE	S
FKA-60	60
-65	65

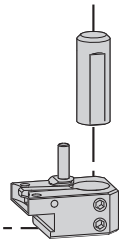
DN40, CT40

FKA-60-L	60
-65-L	65

BT50, DN50, CT50

FKA- 80	80
- 85	85
-110	110





34 Positioning pin

35 Bracket

HUD7

28 D7 type angle shaft CODE UR-D7

31 Collet draw nut CODE UR-ND7

Drill (ϕ1~7)

DETa-1 Collet (D7)→P.8

HUA10

Drill (ϕ2.4~10)

30 CTA10 type angle shaft CODE UR-A10

Endmill (ϕ2.4~10)

Spring collet (C10)→P.8

33 Nut CODE NUA-CTH10-32

HUT4

32 Draw nut and washer CODE UR-T4NS

Tap (M2~8)

Tap sleeve (TA4)→P.8

29 T4 type angle shaft CODE UR-T4

20 Head CODE FBA-U7

19 T nut CODE FCT-U7

24 Collar D CODE FBC-U7D

25 Gear 2B CODE GR2B-U7

26 Collar E CODE FBC-U7E

27 Shell-type needle bearing CODE TLA1812Z

18 Gear 2A CODE GR2A-U7

13

10 Casing CODE FCA-U7

11 Collar C CODE FCC-U7C

12 Wave washer CODE FWW-U7

14 Collar B CODE FCC-U7B

13 Angular bearing CODE 7900A5DB

16 Nut and washer for bearing CODE AN00/AW00

15 Gear 1B CODE GR1B-U7

17 Cover 1 CODE FCK-U7

HUA20 / HUT6 (BT40/50, DN40/50, CT40/50)

CODE (Master Holder)	① Shank
BT40 -HUA20-135	BT40 -FSA-U20
-HUT 6-135	
BT50 -HUA20-150	BT50 -FSA-U20
-HUT 6-150	
DN40A-HUA20-150	DN40A-FSA-U20
-HUT 6-150	
DN50A-HUA20-150	DN50A-FSA-U20
-HUT 6-150	
CT40 -HUA20-150	CT40 -FSA-U20
-HUT 6-150	
CT50 -HUA20-150	CT50 -FSA-U20
-HUT 6-150	

■**Std. Access.**
- Fixing spanner (KS-33)
- Hexagonal wrench set (W-1560S)
- Fook spanner (FC-50) (HUA20)

※③, ⑦, ⑩, ⑭, ⑰, ㉕, ㉗ and ㉙ are able to use standard commercial items.

㉟ Positioning pin

BT40

CODE	Fig.	Pin type	ϕD	L
HP-50S	1	Straight pin	18	50
-50W		Expansion pin		
-50T	3	Taper pin	20	

DN40, CT40

HP-62S	1	Straight pin	18	62
-62W		Expansion pin		
-50TL	3	Taper pin	20	65

BT50, DN50, CT50

HP-62S	1	Straight pin	18	62
-62S-20	2		20	
-62W	1	Expansion pin	18	
-62W-20	2		20	
-62T	3	Taper pin	28	

Fig.1 Fig.2 Fig.3

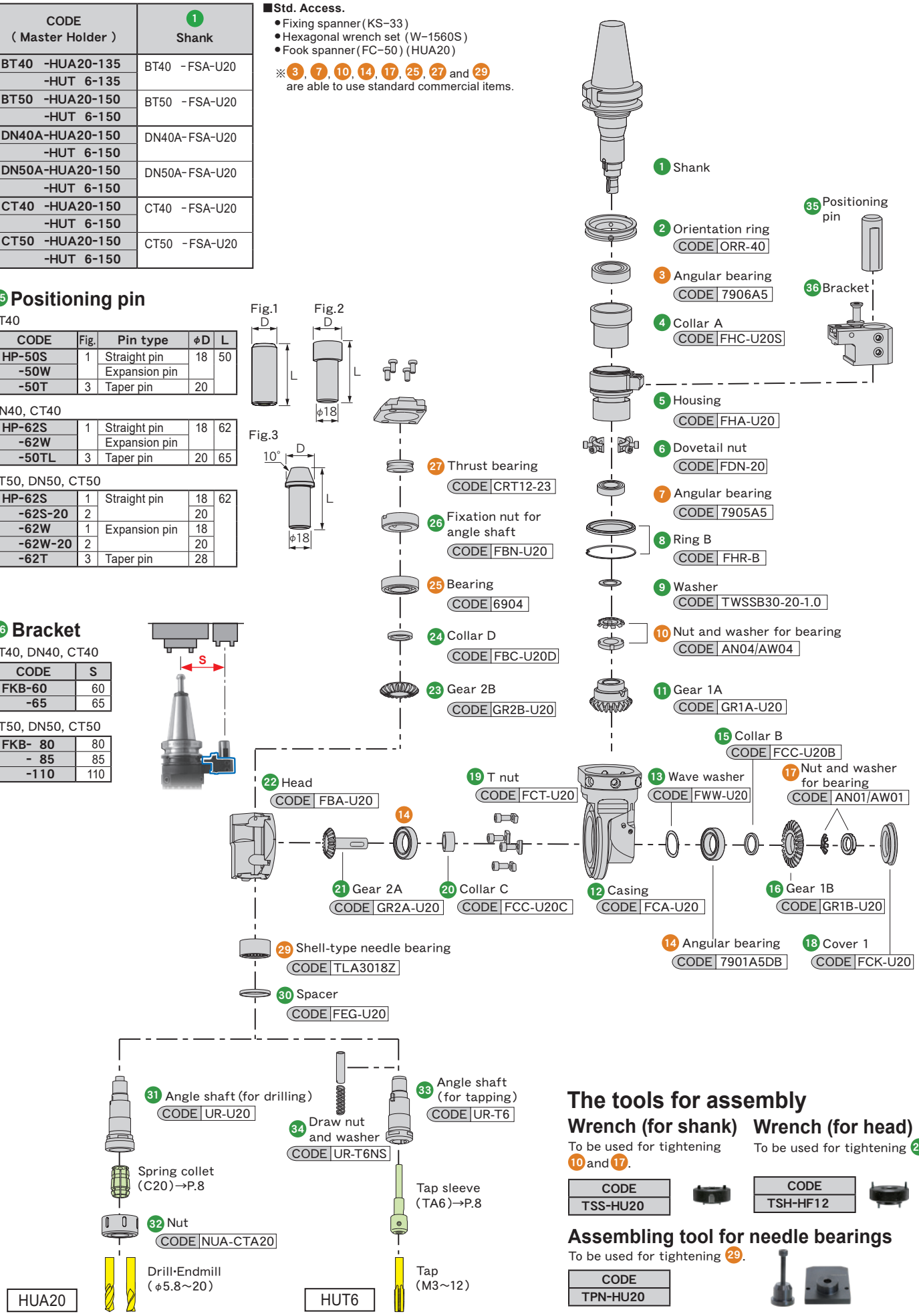
㊱ Bracket

BT40, DN40, CT40

CODE	S
FKB-60	60
-65	65

BT50, DN50, CT50

FKB- 80	80
- 85	85
-110	110



The tools for assembly

Wrench (for shank)

To be used for tightening ⑩ and ⑰.

CODE
TSS-HU20

Wrench (for head)

To be used for tightening ㉖.

CODE
TSH-HF12

Assembling tool for needle bearings

To be used for tightening ㉙.

CODE
TPN-HU20

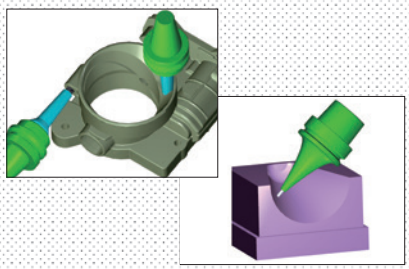
Technical support

At MST, we provide the long-term support that allows you to use our products safely and to maintain the high accuracy of our products for your machining.

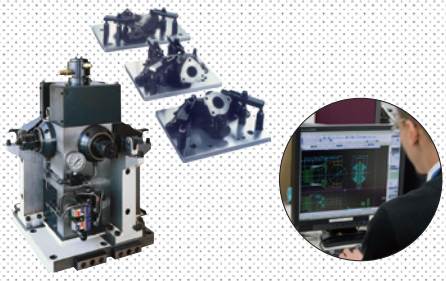
1. Pre-sales

Provide wide-ranging technical support.

Tool selection



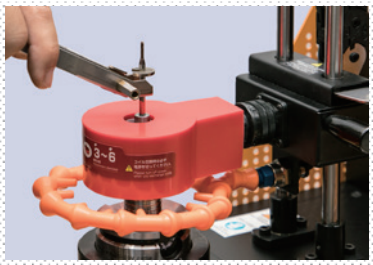
Interference check with 3D drawings



Designing manufacturing jig fixtures

2. On delivery

You will receive instructions.

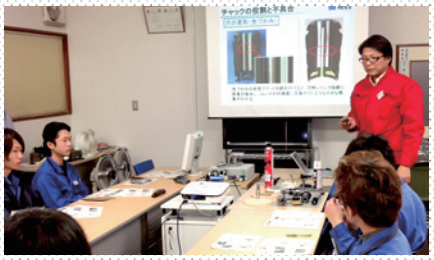


Instructions for a heater

Maintenance instruction

3. Post-sales

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



Seminar

Evaluation

Consulting

Substantial peripheral equipment

Work table
6S DESK
P. 86

Holder,
Tool washing machine
CLEAN BOX
P. 88

TOOL CAP
P. 91

Tool set up stand
P. 94

Test bar
CHECKMATE
P. 90

Tool holder
storage cabinet
P. 98

Cutter protection box
ENDMILL HOUSE
P. 97

Cleaning tool
P. 31

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 tool holder

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. 88

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 cannot re-grind shank 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 get injured by sharp cutting edges.

TOOL CAP
➔ P. 91

Retention knob is comsumable.

Exchange the retention knob regularly.(Usage period is depend on the frequency and cutting condition. Approximately 6 months for heavy duty cutting. 18 months for standard cutting.

ANGLE HEAD

- The gear and bearing in the angle head are consumables. Periodic maintenance is required. The inside of the head can be checked by taking off the aluminum cover and the name plate.
- Be careful about the spindle rotating direction. If used in a wrong rotating direction, it will damage the gears.

DETa-1 Collet Holder

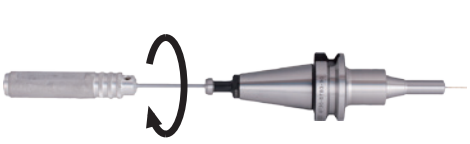
Tighten with the proper torque.

- Excessive tightening will reduce the accuracy and damage the internal components.
- An adjustable torque wrench, which can tighten the nut with the appropriate torque, is available for DTA type holders.

Adjustable torque wrench

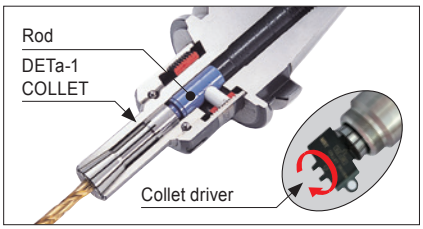
The nut-tightening torque can be adjusted more properly.
➔ P. 31

- For the DTB3, the torque is adequate when the wrench starts to bend. Do not use T-type or L-type wrenches for tightening. If a ommercially-available torque wrench is used, use a screwdriver type.



Firmly attach the DETa-1 collet to a rod.

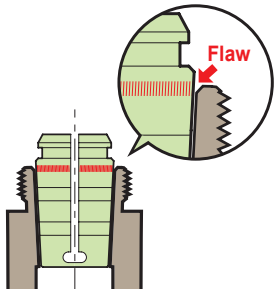
Use a collet driver when screwing in the collet all the way until it stops. If the collet is not screwed in enough, the rod might break. The rod is replaceable.



COLLET HOLDER

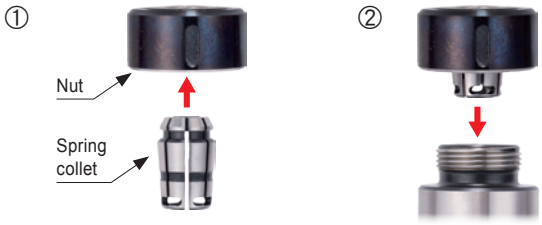
Do not use a collet that has a notch or nick (flaw) on its tapered surface.

In order to maintain the accuracy of the main unit, the hardness of the collet is less than that of the main unit.
If the collet is used with its tapered surface having a notch or nick (flaw) in it, poor accuracy or insufficient tightening can cause an accident.
Replacing the collet will allow you to restore the holder to more or less its initial precision level.



Precautions for collet tightening.

First set the collet into the nut. Do not first put the collet into the tool holder. The collet might get stuck in the tool holder when tightened by the nut.



Tighten with the proper torque.

Excessive tightening will damage the holder. Clean the tool holder thoroughly inside and out when setting it up.
When coolant or chips remain on the thread of the tool holder or the nut, the frictional resistance decreases. This will cause the torque to be similar to the torque experienced when over-tightening. Therefore, even if the tightening torque is correct, it might lead to breakage.

Adjustable torque wrench

The nut-tightening torque can be adjusted more properly.
P.38

Be sure to keep the clamping length of the cutter insertion to a minimum.

Not clamping the cutter with the entire clamping length will cause degradation of accuracy, slipping out of the cutter, and breakage of the tool holder and the nut.

Collet inner diameter	Min. holding length	HOLDER CODE
φ 2.6～10	20	CTA10, CTH10
φ 6 ～20	40	CTA20, CTH20
φ 6 ～ 9.5	38	CTA25, CTH25
φ10 ～15	48	
φ15.5～25	57	
φ25, 28, 30, 32	68	CTA32, CTH32
φ32, 40, 42	70	CTA40

Hi-ART MILLING CHUCK

Do not tighten the collet without inserting a cutting tool.

Tightening the nut without inserting a cutter will cause the clamping portion of the holder to change shape and make it difficult to insert a cutter.

Use the holder within the allowable spindle speed.

HOLDER	MAX.min-1
BT40, A 63-ART32	6000
BT50, A100-ART32	5000
BT50, A100-ART42	3000

Be sure to insert the cutter shank deeper than the minimum clamping depth.

If the internal bore gets damaged, accuracy degradation, gripping torque degradation and unable insertion of the cutter might occur. Refer to "Cutter insertion length" on the chart.

Cutter shank dia.	Min. holding length	
	ART32	ART42
φ 6, 8	30	35
φ10, 12	40	45
φ16, 20	50	
φ25		55
φ32	66	60
φ42	-	76

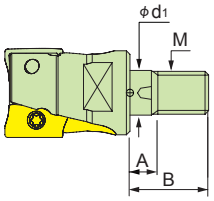
After removing the tool, loosen the nut by another one turn or more.

Otherwise, the next time the tool is clamped, the component of the nut might be damaged. This will also prevent you from being able to grip the tool with sufficient strength, causing the tool to slip during machining.

RED screw arbor

Confirm if an screw-in tool can be used.

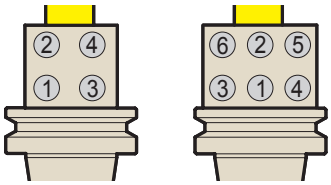
Some of the screw-in end mills cannot be attached to the RED screw arbor.
Please check your screw-in end mills for conformance to the dimensions,or please contact MST.



Holder type	M	φd1	A	B
RSG8	M 8	8.5	10	18
RSG10	M10	10.5	10	22
RSG12	M12	12.5	10	22
RSG16	M16	17	10	25

Tighten the all bolts at least twice.

Tighten the bolts in the order of the numbers marked on them.



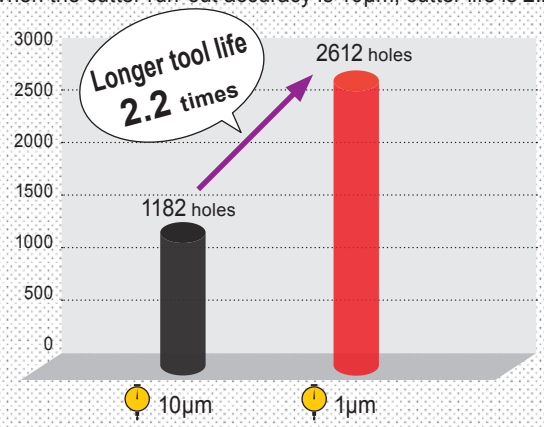
SLZ25 SLZ32, 42

Precautions for tightening the bolts.

If you are unable to loosen the last one or two bolts, tighten all the bolts again and then try to loosen all the bolts again little by little.
(This occurs when the bolts are not loosened equally and little by little from the first step.)
When loosened slowly, the wrench might bend, so loosen the bolts with instantaneous torque.

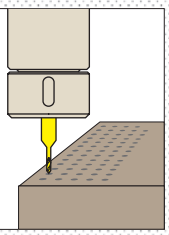
Cutter life comparison depending on different run-out accuracy

When the cutter run-out accuracy is 10μm, cutter life is 2.2 times longer than with 40μm run-out accuracy.



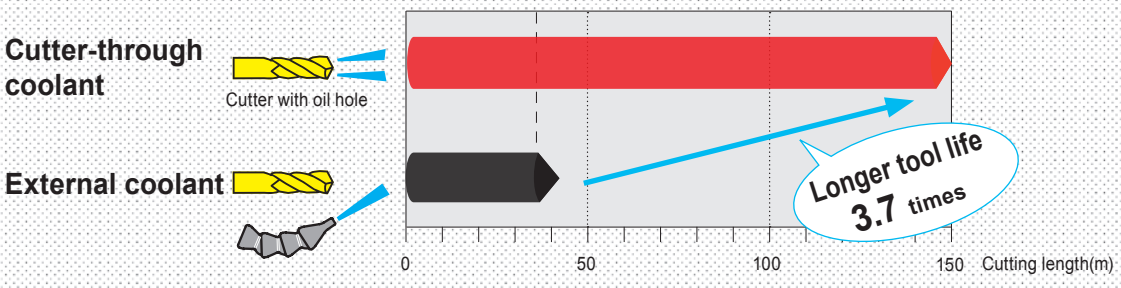
Cutting condition

Cutting tool	:	φ0.1mm drill
Material	:	NAK80(40HRC)
Coolant	:	Water solubility coolant
Revolution	:	20,000min^{-1}
Feed	:	60mm/min
Step feed	:	Non-step
Depth	:	0.4mm



Cutter life comparison when using cutter-through coolant and external coolant

Applying the cutter-through coolant improves the tool life 3.7 times higher than when external coolant is used.

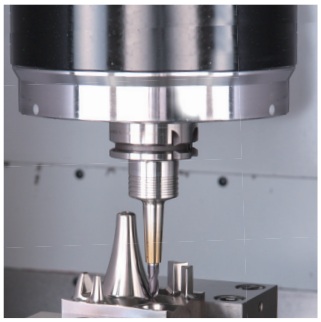


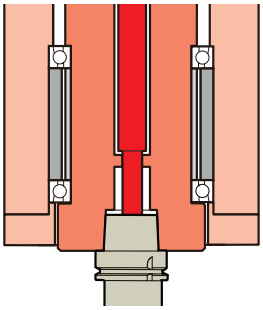
For high-speed spindle rotation

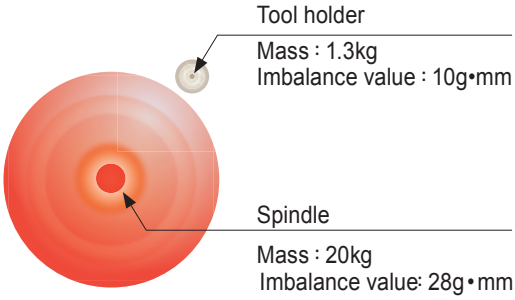
Imbalance value of a machine tool spindle and a tool holder

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.

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







Achieving high-speed, high-efficiency machining requires more than just good balance.

- What is the run-out accuracy of the machine spindle, tool holder and cutting tool?
- Is there taper contact between the machine spindle and tool holder?
- What is the diameter of the cutting tool?
- What is the cutting speed? Spindle rotation?

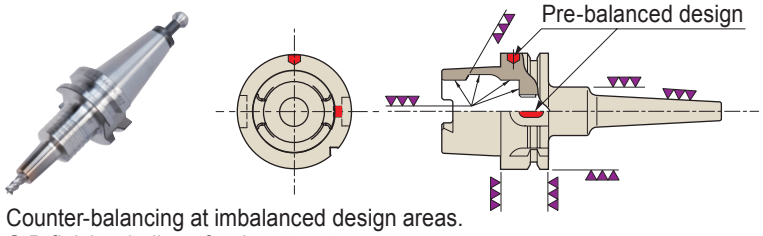
Points to keep in mind at high-speed rotation.

- Minimize the length of a tool holder and cutting tool as short as possible.
- Use high accuracy and compact design tool holders.
- Optimize the cutting condition(rpm, feed and depth of cut).

MST considers these points carefully and produces a tool holder according to our own pre-balanced design concept.

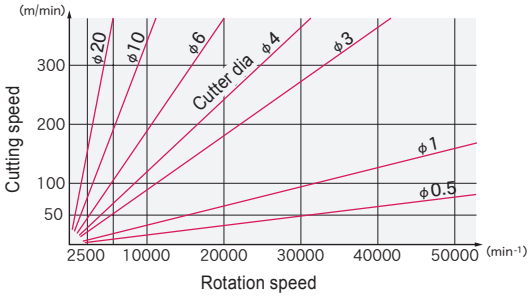
Pre-balanced design

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

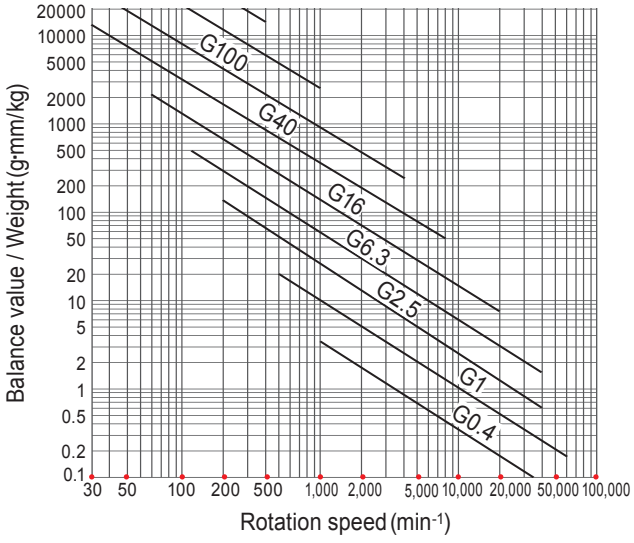


- Counter-balancing at imbalanced design areas.
- O.D finish grinding after heat treatment.

Relationship between a cutter diameter and spindle rotation



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



<<Reference >>

■Recommend various of G grade of a rotating body

G grade	G	Rotating body
G40	~40	The car wheel
G16	~16	The parts of agricultural machines The parts of truck
G 6.3	~ 6.3	Machine tools and aviation gas- turbine rotors after assembling general mechanical parts
G 2.5	~ 2.5	**The spindle of machine tool** Gas turbine Steam turbine
G 1	~ 1	The grinding wheel spindle of grinding machine
G 0.4	~ 0.4	The grinding wheel spindle of precise grinding machine Gyroscope

■Determining tool holder G grade

$$G = \frac{\text{Imbalance value(g·mm)}}{\text{Weight (kg)}} \times \frac{\text{Spindle rotation speed}}{9{,}550}$$

Holders for high-speed operation include "Imbalance value" and "holder weight" columns in the dimensions table.

■Determining G grade of rotating equipment

(spindle · tool holder · cutting tool)

$$G = \frac{\text{(Spindle + Holder + Cutter) Imbalance value(g·mm)}}{\text{(Spindle + Holder + Cutter) Weight (kg)}} \times \frac{\text{Spindle rotation speed}}{9{,}550}$$

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.

▷ 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.

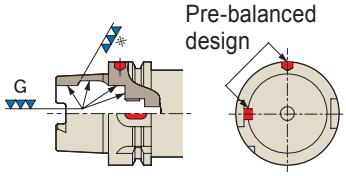
F type
This type uses a combination of different sizes of tapers and flanges.

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 the tool holders applicable for high-speed machining. According to DIN standards, only the area marked with ※ in the hollow shank needs to be finished. However, MST provides perfect finishing for all areas after heat treatment in order to improve balance.

	MST	DIN standard
A63	15 g·mm	75g·mm
A100	28 g·mm	170g·mm

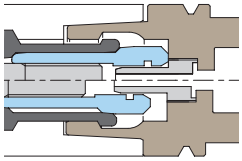


Three times stronger clamping force

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 retention knob 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

Unclamping ⇄ Clamping



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 improve 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.

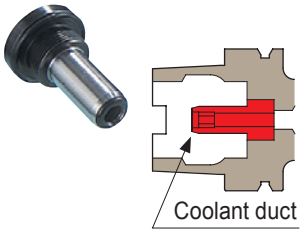
1/10 taper ring gauge

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.



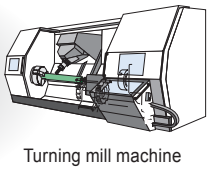
For some machines, the use of a coolant duct (Adjustable) is recommended. The existing coolant duct is replaced with an adjustable one at your request only when you have placed an order for the holder.
→P. 104

TOOLING SYSTEMS for HSK-T

Collaborative development with 17 Japanese manufacturers has resulted in an interface for mill-turning machines based on the HSK-A type.
With its 2008 ISO accreditation, it has become popular standard around the world.

HSK-A Rotating tools

HSK-T Turning tools



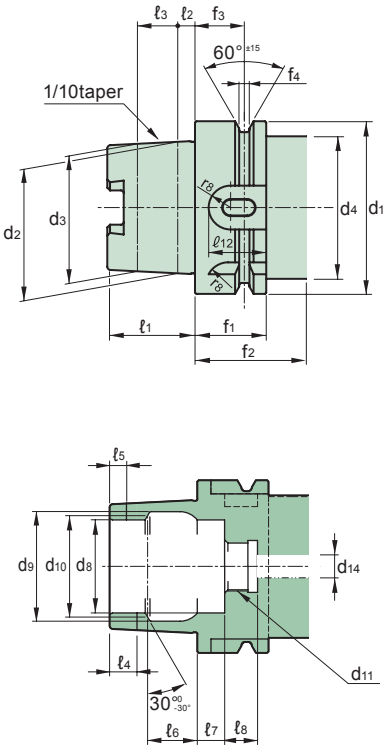
Turning mill machine

Technical data

The shank dimensions

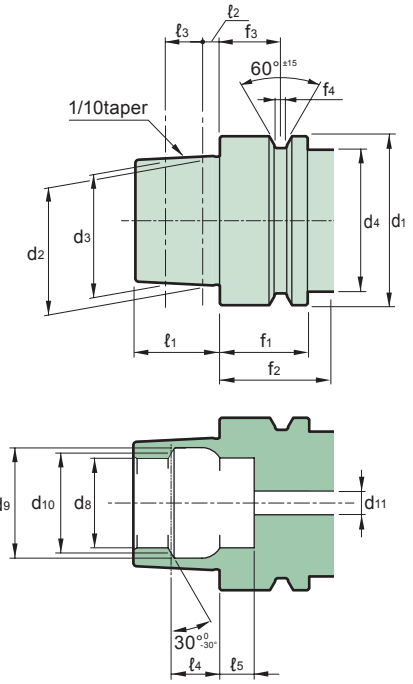
HSK-A (Extracts from DIN 69893-1;1993-07)

Shank	A40	A50	A63	A100	A125
b_1 (H10)	8	10.5	12.5	20	25
b_2 (H10)	9	12	16	20	25
b_3 (H10)	11	14	18	22	28
d_1 (h10)	40	50	63	100	125
d_2	30 +0.007 +0.005	38 +0.009 +0.006	48 +0.011 +0.007	75 +0.015 +0.009	95 +0.018 +0.011
d_3	29.05 +0.005 +0.003	36.9 +0.006 +0.003	46.53 +0.007 +0.003	72.6 +0.009 +0.003	91.95 +0.011 +0.004
d_4 (Max.)	34	42	53	85	105
d_8 (H10)	21	26	34	53	67
d_9 (H11)	25.5	32	40	63	80
d_{10}	23	29	37	58	73
d_{11}	M12 × 1	M16 × 1	M18 × 1	M24 × 1.5	M30 × 1.5
d_{14} (Max.)	5	6.8	8.4	12	14
e_1	10.88	13.797	17.862	27.329	35.324
f_1 ($^{0}_{-0.1}$)	20	26	26	29	29
f_2 (min.)	35	42	42	45	45
f_3 (± 0.1)	16	18	18	20	20
f_4 ($^{+0.15}_{0}$)	2	3.75	3.75	3.75	3.75
h_1 ($^{0}_{-0.2}$)	17	21	26.5	44	55.5
h_2 ($^{0}_{-0.3}$)	12	15.5	20	31.5	39.5
ℓ_1 ($^{0}_{-0.2}$)	20	25	32	50	63
ℓ_2	4	5	6.3	10	12.5
ℓ_3	9.5	11	14.7	24	30.5
ℓ_4 ($^{+0.2}_{0}$)	6	7.5	10	15	19
ℓ_5 ($^{+0.2}_{0}$)	3.5	4.5	6	10	12
ℓ_6 (JS10)	11.42	14.13	18.13	28.56	36.27
ℓ_7 ($^{0}_{-0.1}$)	8	10	10	12.5	16
ℓ_8 ($^{0}_{-0.3}$)	8	10	12	16	18
ℓ_{12}	12	19	21	24	24
r_3 ($^{\pm 0.05}_{-0.05}$)	1.88	2.38	2.88	4.88	5.88
r_8	4.5	6	8	10	5



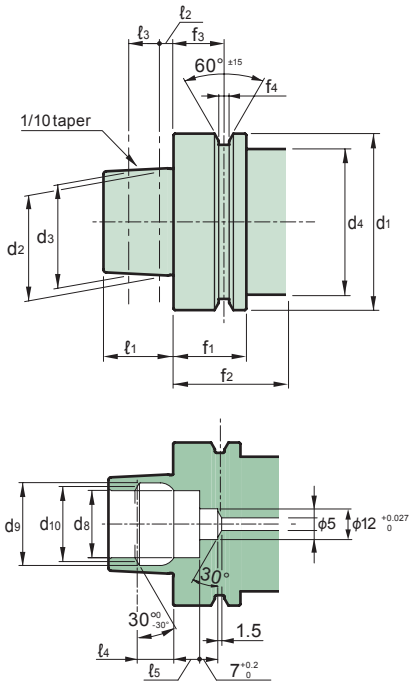
HSK-E (Extracts from DIN V 69893-5;1996-01)

Shank	E25	E32	E40	E50
d_1 (h10)	25	32	40	50
d_2	19 +0.006 +0.004	24 +0.007 +0.005	30 +0.007 +0.005	38 +0.009 +0.006
d_3	18.15 +0.004 +0.002	23.27 +0.005 +0.003	29.05 +0.005 +0.003	36.90 +0.006 +0.003
d_4 (Max.)	20	26	34	42
d_8 (H10)	14	17	21	26
d_9 (H11)	16.4	21	25.5	32
d_{10}	15	19	23	29
d_{11} (Max.)	3	4.2	5	6.8
ℓ_1 ($^{0}_{-0.2}$)	13	16	20	25
ℓ_2	2.5	3.2	4	5
ℓ_3	8.5	7.3	9.5	11
ℓ_4 (JS10)	7.21	8.92	11.42	14.13
ℓ_5 ($^{0}_{-0.1}$)	6	8	8	10
f_1 ($^{0}_{-0.1}$)	10	20	20	26
f_2 (min.)	20	35	35	42
f_3 (± 0.1)	4.5	16	16	18
f_4 ($^{+0.15}_{0}$)	2	2	2	3.75



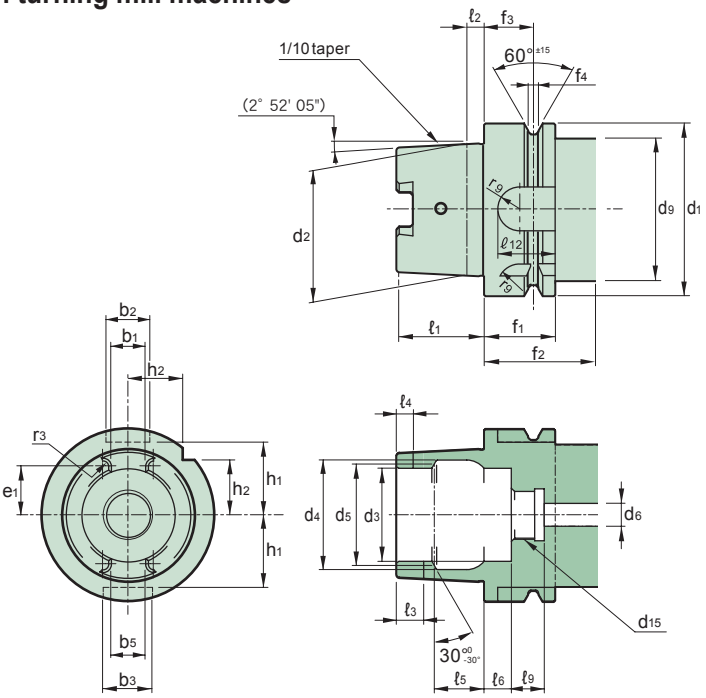
HSK-F (Extracts from DIN 69893-1;1993-07)

Shank	F63	F80
d_1 (h10)	63	80
d_2	38 +0.009 +0.006	48 +0.011 +0.007
d_3	36.9 +0.006 +0.003	46.53 +0.007 +0.003
d_4 (Max.)	53	67
d_8 (H10)	26	34
d_9 (H11)	32	40
d_{10}	29	37
f_1 ($-^{0}_{0.1}$)	26	26
f_2 (min.)	42	42
f_3 (± 0.1)	18	18
f_4 ($^{+0.15}_{0}$)	3.75	3.75
ℓ_1 ($-^{0}_{0.2}$)	25	32
ℓ_2	5	6.3
ℓ_3	11	14.7
ℓ_4 (Js10)	14.13	18.13
ℓ_5 ($-^{0}_{0.1}$)	10	10
f_1 ($-^{0}_{0.1}$)	26	26
f_2 (min.)	42	42
f_3 (± 0.1)	18	18
f_4 ($^{+0.15}_{0}$)	3.75	3.75



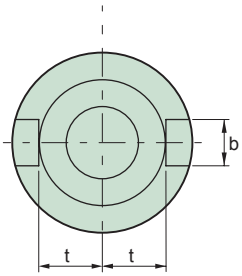
HSK-T (Extracts from DIN 69893-1;1993-07) For turning with turning mill machines

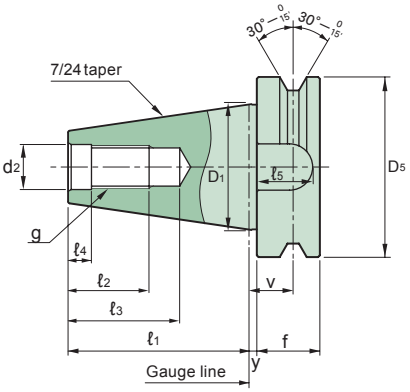
Shank	T40	T50	T63	T100	T125
b_1 ($^{+0.04}_{-0.04}$)	8.05	10.54	12.54	20.02	25.02
b_2 (H10)	9	12	16	20	25
b_3 (H10)	11	14	18	22	28
b_5	7.932 +0.03 0	10.425 +0.035 0	12.425	19.91	24.915 +0.04 0
d_1 (h10)	40	50	63	100	125
d_2	30.007	38.009	48.010	75.013	95.016
d_3 (H10)	21	26	34	53	67
d_4 (H11)	25.5	32	40	63	80
d_5	23	29	37	58	73
d_6 (Max.)	5	6.8	8.4	12	14
d_9 (Max.)	39	49	62	99	124
d_{15}	M12 × 1	M16 × 1	M18 × 1	M24 × 1.5	M30 × 1.5
e_1	11	13.88	17.99	27.37	35.37
f_1 ($-^{0}_{0.1}$)	20	26	26	29	29
f_2 (min.)	23	30	30	34	34
f_3 (± 0.1)	16	18	18	20	20
f_4 ($^{+0.15}_{0}$)	2	3.75	3.75	3.75	3.75
h_1 ($-^{0}_{0.2}$)	17	21	26.5	44	55.5
h_2 ($-^{0}_{0.3}$)	12	15.5	20	31.5	39.5
ℓ_1 ($-^{0}_{0.2}$)	20	25	32	50	63
ℓ_2	4	5	6.3	10	12.5
ℓ_3 ($^{+0.2}_{0}$)	6	7.5	10	15	19
ℓ_4 ($^{+0.2}_{0}$)	3.5	4.5	6	10	12
ℓ_5 (JS10)	11.42	14.13	18.13	28.56	36.27
ℓ_6 ($-^{0}_{0.1}$)	8	10	10	12.5	16
ℓ_9 ($-^{0}_{0.2}$)	8	10	12	16	18
ℓ_{12}	12	19	21	24	24
r_3 ($^{+0.05}_{-0.05}$)	1.88	2.38	2.88	4.88	5.88
r_9	4.5	6	8	10	5



BT (Extracts from MAS 403)

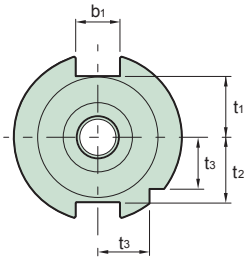
Shank	BT30	BT40	BT50
D_1	31.75	44.45	69.85
ℓ_1 (± 0.15)	48.4	65.4	101.8
d_2 (H8)	12.5	17	25
g (6H)	M12	M16	M24
ℓ_2 (min.)	24	30	45
ℓ_3 (min.)	34	43	62
ℓ_4	7	9	13
b (H12)	16.1	16.1	25.7
ℓ_5 (min.)	17	21	31
t ($^{0}_{-0.2}$)	16.3	22.6	35.4
D_5 (h8)	46	63	100
f	20	25	35
v (± 0.1)	13.6	16.6	23.2
y (± 0.4)	2	2	3

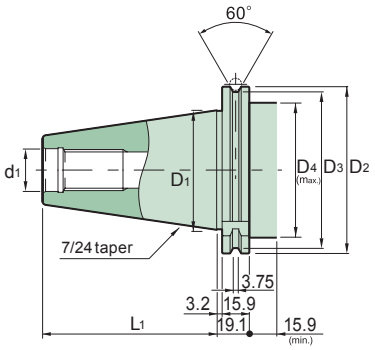




DIN (DIN69871-1)

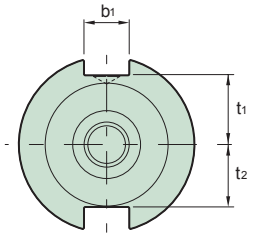
Shank	DN40	DN50
D_1	44.45	69.85
D_2	63.55	97.5
D_3	56.25	91.25
D_4	50	80
L_1	68.4	101.75
L_3	3.75	6.495
b_1	16.1	25.7
d_1	17	25
t_1	22.8	35.5
t_2	25	37.7
t_3	18.5	30

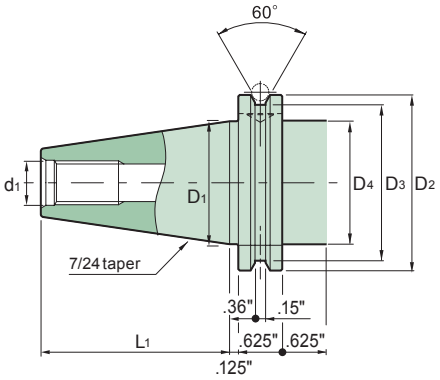




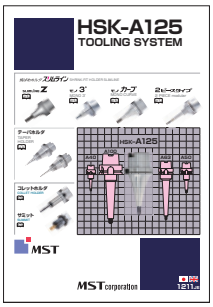
CAT.

Shank	CT40	CT50
D_1	1.75	2.75
D_2	2.5	3.88
D_3	2.22	3.59
D_4	1.75	2.75
L_1	2.69	4
b_1	.65	1.06
d_1	.64	1.03
t_1	.99	1.49
t_2	.84	1.39





HSK-A125/ F80PD are also available as standard products.



If you would like more detailed information, please contact MST and ask for a catalog.

Drill hole size in metric coarse screw thread

Nominal size x pitch	Drill hole dia.
M 1 ×0.25	0.75
M 1.2×0.25	0.95
M 1.6×0.35	1.25
M 2 ×0.4	1.6
M 2.5×0.45	2.1
M 3 ×0.5	2.5
M 4 ×0.7	3.3
M 5 ×0.8	4.2
M 6 ×1	5
M 8 ×1.25	6.8
M10 ×1.5	8.5
M12 ×1.75	10.3
M16 ×2	14
M20 ×2.5	17.5
M24 ×3	21
M30 ×3.5	26.5
M33 ×3.5	29.5
M36 ×4	32
M39 ×4	35
M42 ×4.5	37.5
M45 ×4.5	40.5
M48 ×5	43

Drill hole size in unified screw threads

Nominal size x pitch	Drill hole dia.
NO. 1 - 64UNC	1.55
NO. 2 - 56UNC	1.8
NO. 3 - 48UNC	2.1
NO. 4 - 40UNC	2.3
NO. 5 - 40UNC	2.6
NO. 6 - 32UNC	2.8
NO. 8 - 32UNC	3.4
NO.10 - 24UNC	3.9
NO.12 - 24UNC	4.5
1/4 - 20UNC	5.1
5/16 - 18UNC	6.6
3/8 - 16UNC	8
7/16 - 14UNC	9.4
1/2 - 13UNC	10.8
9/16 - 12UNC	12.2
5/8 - 11UNC	13.6
3/4 - 10UNC	16.5
7/8 - 9UNC	19.5
1 -8UNC	22.2
1 1/8 - 7UNC	25
1 1/4 - 7UNC	28.2
1 3/8 - 6UNC	30.8
1 1/2 - 6UNC	34
1 3/4 - 5UNC	39.5

Drill hole size in screw for pipe

Nominal size	Rc(PT)	Rp(PS)	G(PF)
1/8	8.2	8.5	8.8
1/4	10.9	11.4	11.87
3/8	14.4	14.9	15.38
1/2	18	18.5	19.1
5/8	—	—	21
3/4	23	24	24.6
7/8	—	—	28.3
1	29	30	30.9
1 1/8	—	—	35.5
1 1/4	38	39	39.4
1 1/2	44	45	45.4

Dia. of tap shank

Metric screw threads	Unified screw threads	Gas screw threads	φD2
φD1			
M 1~M 2.6	UNo. 0~ 4		3
M 3・M 3.5	UNo. 5・6		4
M 4・M 4.5	UNo. 8		5
M 5・M 5.5	UNo.10・12		5.5
M 6	U 1/4		6
	U 5/16		6.1
M 7・M 8			6.2
M 9・M10	U 3/8		7
M11	U 7/16	P1/16・1/8	8
M12			8.5
	U 1/2		9
M13			9.5
M14・M15	U 9/16		10.5
		P 1/4	11
	U 5/8		12
M16			12.5
M17			13
M18	U 3/4	P 3/8	14
M20			15
M22	U 7/8		17
		P 1/2	18
M24・M25		P 5/8	19
M26・M27	U1		20
M28			21
	U1 1/8		22
M30		P 3/4	23
M32	U1 1/4	P 7/8	24
M33			25
M35	U1 3/8	P1	26
M36・M38		P1 1/8	28
M39・M40	U1 1/2		30
M42	U1 5/8	P1 1/4	32
M45	U1 3/4	P1 3/8	35
M48		P1 1/2	38
M50	U2	P1 5/8	40
M52		P1 3/4	42

Dimensional tolerance of typically used mating (JIS B 0401)

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
50	80	+8 0	+13 0	+19 0	+30 0	+46 0	+74 0	0 -8	0 -13	0 -19	0 -30	0 -46	0 -74
80	120	+10 0	+15 0	+22 0	+35 0	+54 0	+87 0	0 -10	0 -15	0 -22	0 -35	0 -54	0 -87
120	180	+12 0	+18 0	+25 0	+40 0	+63 0	+100 0	0 -12	0 -18	0 -25	0 -40	0 -63	0 -100
180	250	+14 0	+20 0	+29 0	+46 0	+72 0	+115 0	0 -14	0 -20	0 -29	0 -46	0 -72	0 -115
250	315	+16 0	+23 0	+32 0	+52 0	+81 0	+130 0	0 -16	0 -23	0 -32	0 -52	0 -81	0 -130
315	400	+18 0	+25 0	+36 0	+57 0	+89 0	+140 0	0 -18	0 -25	0 -36	0 -57	0 -89	0 -140
400	500	+20 0	+27 0	+40 0	+63 0	+97 0	+155 0	0 -20	0 -27	0 -40	0 -63	0 -97	0 -155

Conversion table for International System of Units

Force

N	kgf
1	1.01972×10^{-1}
9.80665	1

Pressure

Pa	kgf/cm²
1	1.01972×10^{-5}
9.80665×10^{4}	1

Stress

Pa	kgf/mm²
1	1.01972×10^{-7}
9.80665×10^{6}	1

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	BT50 – SLRA4 – 110 – M42	SLIMLINE MONO series SLIMLINE STRAIGHT ARBOR	※
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※See our dedicated catalog for shrink-fit holder SLIMLINE.
For details, please contact us.

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S	Stationary bracket (ANGLE HEAD HALF)	FKA – 60	105 ～
S		FKB – 60	
S		FKC – 50	
	Straight collet (Hi-ART MILLING CHUCK)	S42 – 6F	42
	Stud bolt (WIRE CUT UNIT)	STB – M6 – L	102
	Sukima nut (COLLET HOLDER)	NUB – CTH10 – 3.6	39, 104
	SUMMIT	A100 – SLZ25 – 135	44
T	Tap collet (ANGLE HEAD HALF mini type)	FCS6 – M4	10
T	Tap rod (DETa-1 COLLET HOLDER DTE type)	TR – 5	30
T	Tap sleeve (ANGLE HEAD HALF)	TA4 – M2	8
T	TEST BAR (ANGLE HEAD UNIVERSAL type)	TBU10	18
T	TEST BAR CHECKMATE	NT30 – CMA – 20 – 125	90
T		HSK32 – CMB – 25 – 175	
T	The Manual clamping head (SMART GRIP)	F160H32 – A40 – 50	78
T	Throw-away tip (MICRO HEAD MBJ type)	CCD094 – PA	62
T	TOOL CAP TCA type	TCA2022 – 10	92
T	TOOL CAP TCB type	TCB0820 – 10	
T	TOOL CAP TCC type	TCC0607 – 50	93
T	TOOL HOLDER STORING CABINET	HBX – A40	98
T	Tool set up stand (Vice clamping type)	HF – BT30	95
U	UNIVERSAL FACING BORING HEAD	MU – S6H	73
V	Variety set (TOOL CAP TCC type)	TCC – F	93
W	WIRE CUT UNIT	WCU – A	101
W	Wrench	DW/RC/TW/W	103
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