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# ANGLE HEADS

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- MODULAR SERIES
- HI-SPEED MODULAR SERIES
- SOLID SERIES
- HALF SERIES



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**CATALOG MAH**

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**NEW**



**HIGH SPEED MODULAR SHANKS FOR  
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**SOLID & FLANGE SERIES**

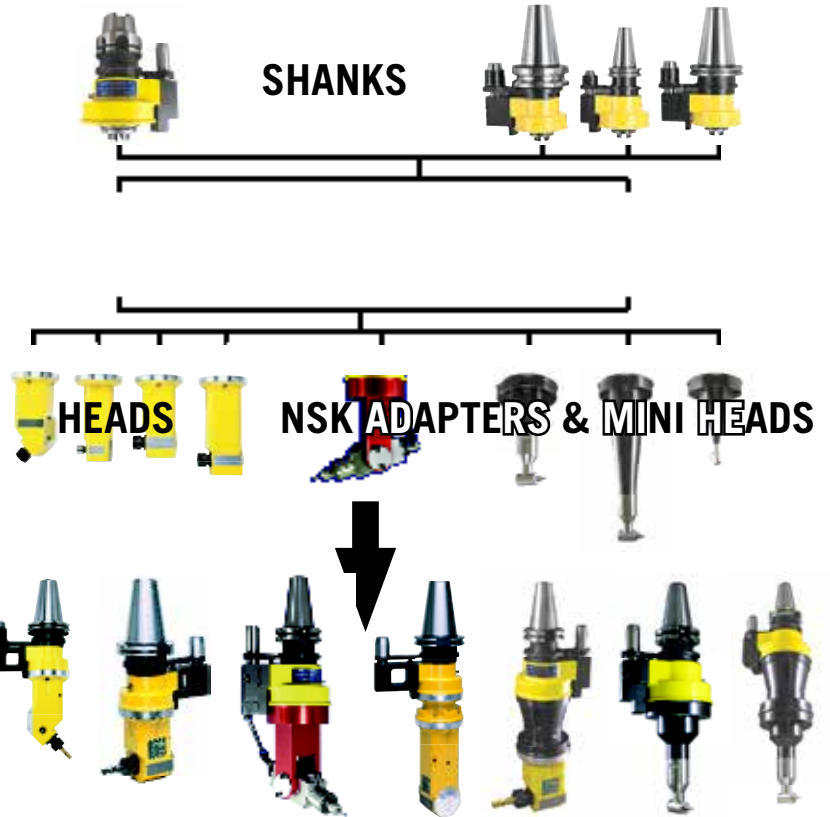
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# MST ANGLE HEADS - MODULAR SERIES



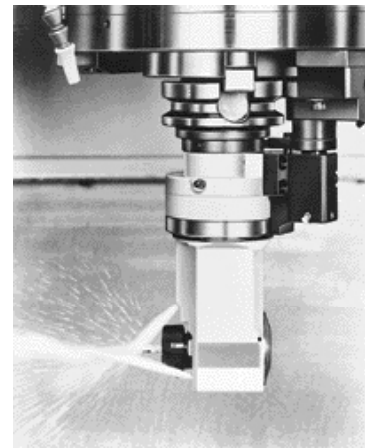
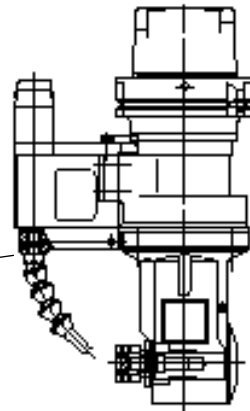
## Recommended Grease for All Series

- Mobilux EP1
- Shell Alvania EP1

- A WIDE VARIETY OF SHANKS, ANGLE HEADS, AND ACCESSORIES
- MECHANICALLY DRIVEN WITH NSK MINI SERIES ANGLE HEADS
- HARDENED PRECISION SPIRAL BEVEL GEARS FOR OPTIMUM RIGIDITY
- SPLASH COOLANT THRU BODY ON MOST MODELS
- BUILT-IN EXTERNAL COOLANT SUPPLY PORT
- A RUGGED CAST IRON BODY DESIGN
- SUPERIOR PRECISION
- COMPACT DESIGN



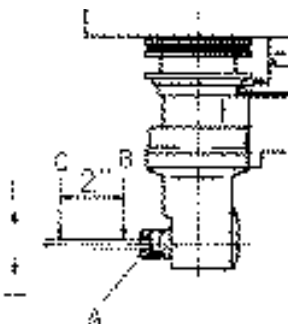
External  
Coolant  
Port



Splash Coolant Thru Body

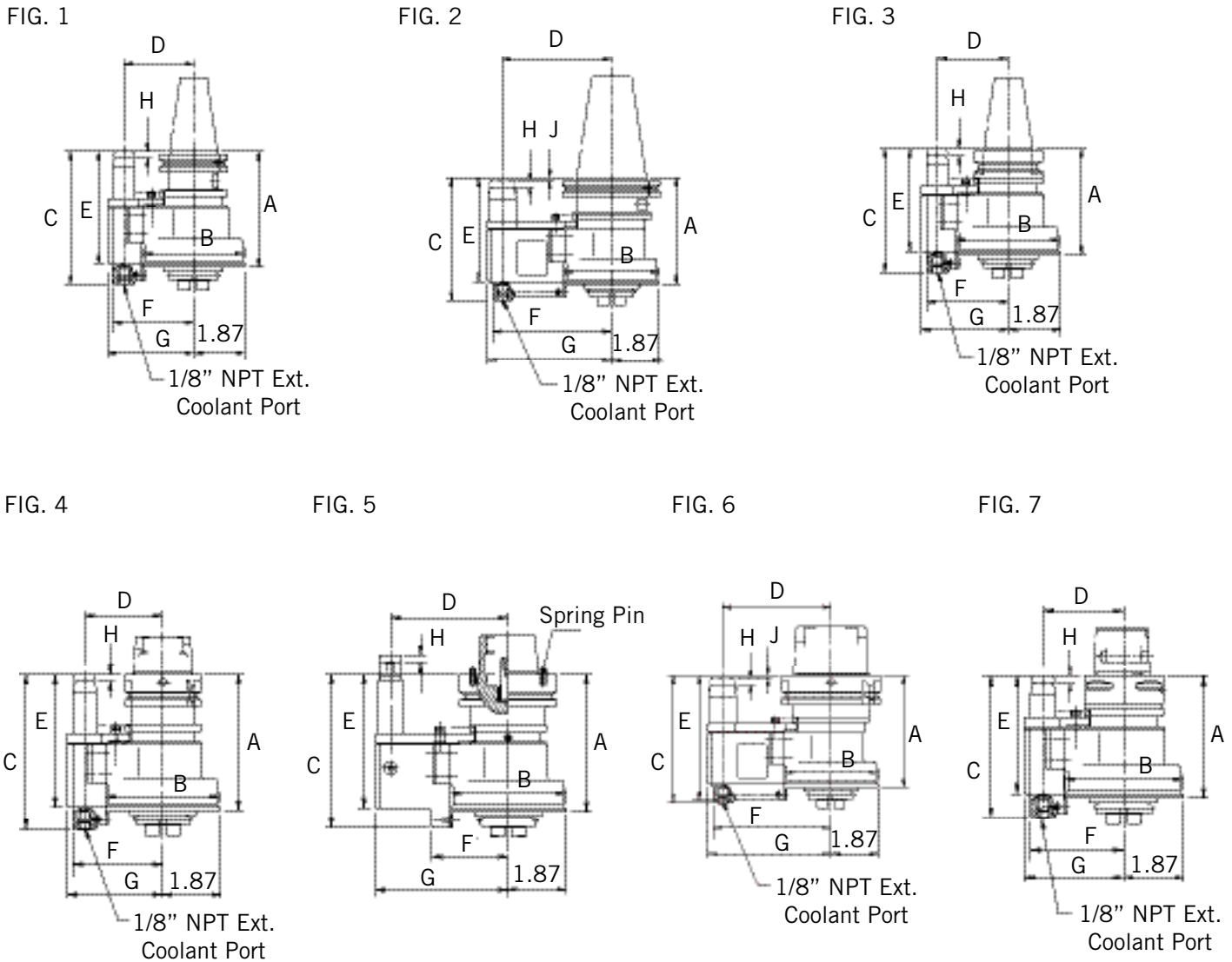
## GUARANTEED ACCURACIES

Cavity at Bore	A	.0002" TIR
Test Bar at Face	B	.0004" TIR
Test Bar at 2"	C	.0006" TIR
Deviation of Angle (high or low of C under B = 0)	90°	±.0004" TIR



# MST ANGLE HEADS - MODULAR SERIES

## SHANKS



TAPER	ORDER NO.	A	B	C	D*	E	F	G	H	J	FIG.
CAT40	140 SHANK	4.25	3.74	4.88	2.56	4.13	2.95	3.15	.236	—	1
CAT50	150 SHANK	4.25		4.88	4.33	4.13	4.72	4.92		.118	2
BT40	240 SHANK	3.86		4.49	2.56	3.74	2.95	3.15		—	3
HSK63A	063 SHANK	4.45		5.08	2.56	4.33	2.95	3.15		—	4
HSK80F**	F80PD SHANK	4.45		4.96	—	4.33	2.48	4.31		—	5
HSK100A	100 SHANK	4.45		5.08	4.33	4.96	4.72	4.92		.118	6
C6	C6 SHANK	3.86		4.49	2.56	3.74	2.95	3.15		—	7

Note: \* means optional D dimension of 2.36 for CAT40, BT40 & HSK63A is available.

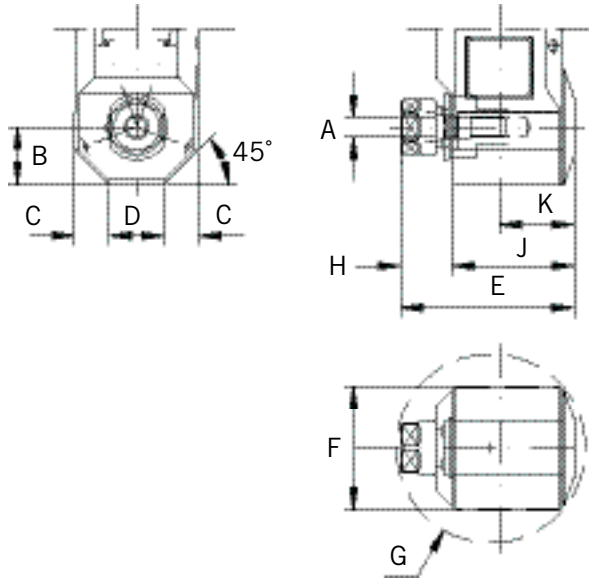
The optional D dimension is 3.15 and 3.35 for CAT50 and HSK100A.

Note: \*\* means F80PD Shank is exclusively for MAKINO MAG1 and MAG3.

Note: Capto C8 & KM shanks are available upon request.

# MST ANGLE HEADS - MODULAR SERIES

## HEADS



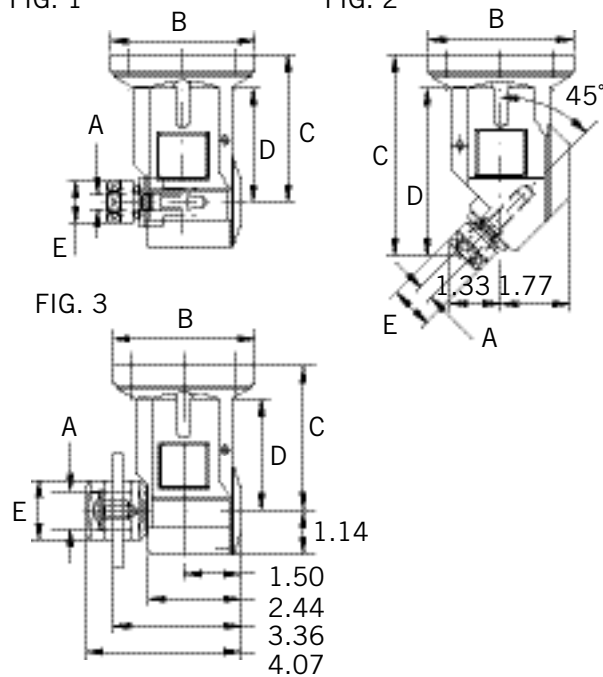
MODEL	COLLET	RANGE A	B	C	D	E
159	#107 (ER20)	.019-.511	1.14	.67	1.10	3.78
162	#103 (ER16)	.019-.393	1.14	.67	1.10	3.46
164	#102 (ER11)	.019-.275	.87	.55	1.10	2.84
165	#101 (ER8)	.019-.196	.79	.39	1.02	2.24

MODEL	F	øG	H	J	K
159	2.46	4.10	1.34	2.44	1.50
162	2.46	3.80	1.02	2.44	1.50
164	2.22	2.90	.89	1.95	1.14
165	1.83	2.50	.61	1.63	.98

Note: G dimension is the smallest ID for the head to fit into.

FIG. 1

FIG. 2

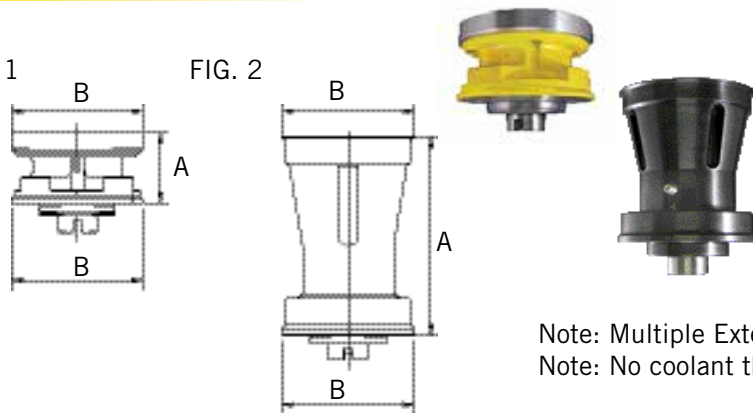


ORDER NO.	COLLET	A	B	C	D	E	FIG.
159-3 HEAD	#107 (ER20)	.019-.511	3.74	3.82	2.95	1.34	1
159-6 HEAD	#107 (ER20)	.019-.511		6.18	5.31	1.34	
162-3 HEAD	#103 (ER16)	.019-.393		3.82	2.95	1.10	
162-6 HEAD	#103 (ER16)	.019-.393		6.18	5.31	1.10	
164-2 HEAD	#102 (ER11)	.019-.275		3.23	2.52	.75	
164-5 HEAD	#102 (ER11)	.019-.275		5.59	4.88	.75	
165-3 HEAD	#101 (ER8)	.019-.196		4.41	3.50	.47	
165-6 HEAD	#101 (ER8)	.019-.196		6.77	5.87	.47	
198-3 HEAD	STUB ARBOR	ø1.00 PILOT		3.82	2.95	1.57	
262-4 HEAD	#103 (ER16)	.019-.393	5.20	4.34	1.10	2	

## EXTENSIONS

FIG. 1

FIG. 2

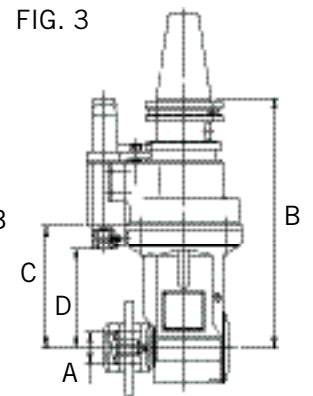
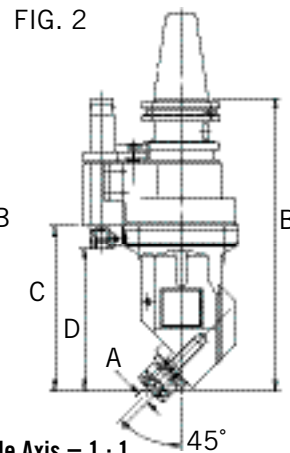
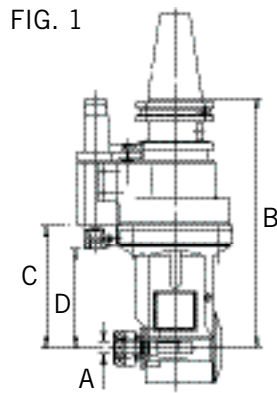
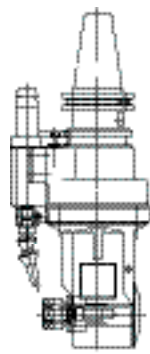


ORDER NO.	A	B	WT (LB.)	FIG.
159-159-2	2.00	3.74	3.25	1
159-159-4	4.00		7.3	2
159-159-6	6.00		10.3	

Note: Multiple Extensions can be stacked together for additional reach.  
Note: No coolant thru body feature available for Extensions.



# MST ANGLE HEADS - MODULAR SERIES



Gear Ratio of Spindle to Angle Axis = 1 : 1  
Rotating Direction of Spindle to Angle Axis = CCW : CW

## CAT & BT FLANGE TOOL SHANKS

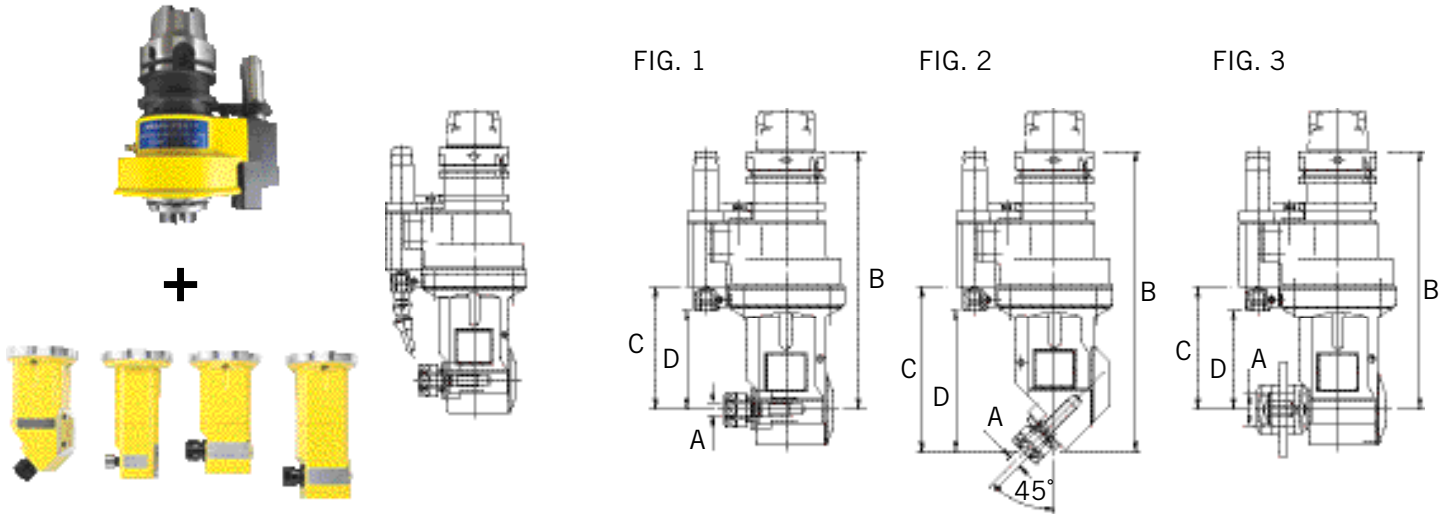
TAPER	ORDER NO.	SHANK	HEAD	RANGE A	COLLET	B	C	D	MAX RPM	WT.	FIG.
CAT40	140-159-3	140 SHANK	159-3 HEAD	.019-.511	#107 (ER20)	8.07	3.94	3.19	5,000/ *6,000	13.8	1
	140-159-6		159-6 HEAD			10.43	6.30	5.55		17.6	
	140-162-3		162-3 HEAD	.019-.393	#103 (ER16)	8.07	3.94	3.19		13.8	
	140-162-6		162-6 HEAD			10.43	6.30	5.55		17.6	
	140-164-2		164-2 HEAD	.019-.275	#102 (ER11)	7.48	3.35	2.60		11.8	
	140-164-5		164-5 HEAD			9.84	5.71	4.96		14.7	
	140-165-3		165-3 HEAD	.019-.196	#101 (ER8)	8.66	4.53	3.78		12.3	
	140-165-6		165-6 HEAD			11.02	6.89	6.14		14.3	
	140-262-4		262-4 HEAD	.019-.393	#103(ER16)	9.45	5.32	4.57		13.8	
CAT50	150-159-3	150 SHANK	159-3 HEAD	.019-.511	#107 (ER20)	8.07	3.94	3.19	5,000/ *6,000	19.8	1
	150-159-6		159-6 HEAD			10.43	6.30	5.55		23.6	
	150-162-3		162-3 HEAD	.019-.393	#103 (ER16)	8.07	3.94	3.19		19.8	
	150-162-6		162-6 HEAD			10.43	6.30	5.55		23.6	
	150-164-2		164-2 HEAD	.019-.275	#102 (ER11)	7.48	3.35	2.60		17.8	
	150-164-5		164-5 HEAD			9.84	5.71	4.96		20.7	
	150-165-3		165-3 HEAD	.019-.196	#101 (ER8)	8.66	4.53	3.78		18.3	
	150-165-6		165-6 HEAD			11.02	6.89	6.14		20.3	
	150-262-4		262-4 HEAD	.019-.393	#103(ER16)	9.45	5.32	4.57		19.8	
BT40	240-159-3	240 SHANK	159-3 HEAD	.019-.511	#107 (ER20)	7.68	3.94	3.19	5,000/ *6,000	13.6	1
	240-159-6		159-6 HEAD			10.04	6.30	5.55		17.4	
	240-162-3		162-3 HEAD	.019-.393	#103 (ER16)	7.68	3.94	3.19		13.6	
	240-162-6		162-6 HEAD			10.04	6.30	5.55		17.4	
	240-164-2		164-2 HEAD	.019-.275	#102 (ER11)	7.09	3.35	2.60		11.6	
	240-164-5		164-5 HEAD			9.45	5.71	4.96		14.5	
	240-165-3		165-3 HEAD	.019-.196	#101 (ER8)	8.27	4.53	3.78		12.1	
	240-165-6		165-6 HEAD			10.63	6.89	6.14		14.1	
	240-262-4		262-4 HEAD	.019-.393	#103(ER16)	9.06	5.32	4.57		13.6	
CAT40	140-198-3	140 SHANK	198-3 HEAD	ø1.00 PILOT	STUB ARBOR	8.07	3.94	3.19	5,000	14.5	3
CAT50	150-198-3	150 SHANK				7.68				14.3	
BT40	240-198-3	240 SHANK				7.68				14.3	

Note: Purchase ER collets (p33) and Common Positioning Block (p32) separately, if needed.

Note: The diagram above is shown with an optional coolant hose. The weight (WT) is in lb.

Note: \* means the max rpm with coolant thru body.

# MST ANGLE HEADS - MODULAR SERIES



Gear Ratio of Spindle to Angle Axis = 1 : 1  
 Rotating Direction of Spindle to Angle Axis = CCW : CW

## HSK FLANGE TOOL SHANKS

TAPER	ORDER NO.	SHANK	HEAD	RANGE A	COLLET	B	C	D	MAX RPM	WT.	FIG.
A63	063-159-3	063 SHANK	159-3 HEAD	.019-.511	#107(ER20)	8.27	3.94	3.19	5,000/ *6,000	13.7	1
	063-159-6		159-6 HEAD			10.63	6.30	5.55		17.5	
	063-162-3		162-3 HEAD	.019-.393	#103(ER16)	8.27	3.94	3.19		13.1	
	063-162-6		162-6 HEAD			10.63	6.30	5.55		17.5	
	063-164-2		164-2 HEAD	.019-.275	#102(ER11)	7.68	3.35	2.60		11.7	
	063-164-5		164-5 HEAD			10.04	5.71	4.96		14.6	
	063-165-3		165-3 HEAD	.019-.196	#101(ER8)	8.86	4.53	3.78		12.2	
	063-165-6		165-6 HEAD			11.22	6.89	6.14		14.2	
	063-262-4		262-4 HEAD	.019-.393	#103(ER16)	9.65	5.32	4.57		13.7	
A100	100-159-3	100 SHANK	159-3 HEAD	.019-.511	#107(ER20)	8.27	3.94	3.19	5,000/ *6,000	18.5	1
	100-159-6		159-6 HEAD			10.63	6.30	5.55		22.3	
	100-162-3		162-3 HEAD	.019-.393	#103(ER16)	8.27	3.94	3.19		17.9	
	100-162-6		162-6 HEAD			10.63	6.30	5.55		22.3	
	100-164-2		164-2 HEAD	.019-.275	#102(ER11)	7.68	3.35	2.60		16.5	
	100-164-5		164-5 HEAD			10.04	5.71	4.96		19.4	
	100-165-3		165-3 HEAD	.019-.196	#101(ER8)	8.86	4.53	3.78		17.0	
	100-165-6		165-6 HEAD			11.22	6.89	6.14		19.0	
	100-262-4		262-4 HEAD	.019-.393	#103(ER16)	9.65	5.32	4.57		18.5	
A63	063-198-3	063 SHANK	198-3 HEAD	ø1.00 PILOT	STUB ARBOR	8.27	3.94	3.19	5,000	14.4	3
A100	100-198-3	100 SHANK								19.3	

Note: Purchase ER collets (p33) and Common Positioning Block (p32) separately.

Note: \* means the max rpm with coolant thru body. The weight (WT) is in lb.

Note: The diagram above is shown with an optional coolant hose.

# MST ANGLE HEADS - MODULAR SERIES

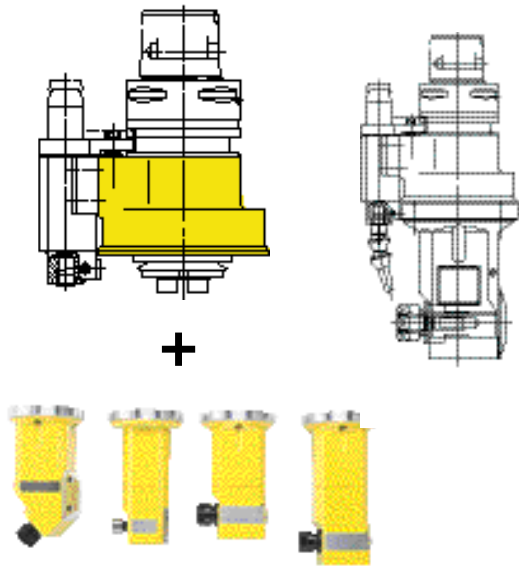


FIG. 1

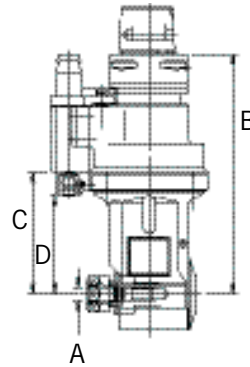


FIG. 2

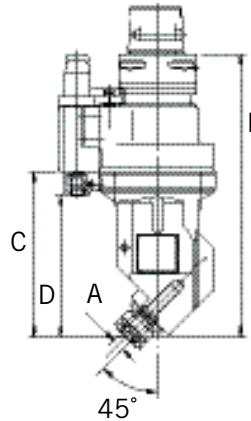
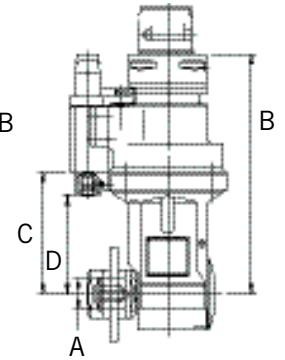


FIG. 3



**Gear Ratio of Spindle to Angle Axis = 1 : 1**  
**Rotating Direction of Spindle to Angle Axis = CCW : CW**

## CAPTO FLANGE TOOL SHANKS

TAPER	ORDER NO.	SHANK	HEAD	RANGE A	COLLET	B	C	D	MAX RPM	WT.	FIG.	
C6	C6-159-3	C6 SHANK	159-3 HEAD	.019-.511	#107(ER20)	7.68	3.94	3.19	5,000/ *6,000	14.0	1	
	C6-159-6		159-6 HEAD			10.04	6.30	5.55		17.8		
	C6-162-3		162-3 HEAD	.019-.393	#103(ER16)	7.68	3.94	3.19		14.0		
	C6-162-6		162-6 HEAD			10.04	6.30	5.55		17.8		
	C6-164-2		164-2 HEAD	.019-.275	#102(ER11)	7.09	3.35	2.60		12.0		
	C6-164-5		164-5 HEAD			9.45	5.71	4.96		14.9		
	C6-165-3		165-3 HEAD	.019-.196	#101(ER8)	8.27	4.53	3.78		12.5		
	C6-165-6		165-6 HEAD			10.63	6.89	6.14		14.5		
	C6-262-4		262-4 HEAD	.019-.393	#103(ER16)	9.06	5.32	4.57		13.9		2
	C6-198-3		198-3 HEAD	Ø1.00 PILOT	STUB ARBOR	7.68	3.94	3.19		5,000		14.7

Note: Purchase ER collets (p33) and Common Positioning Block (p32) separately.

Note: \* means the maximum rpm with coolant thru body.

Note: The weight (WT) is in lb.

Note: Capto C8 & KM shanks are available upon request.

Note: The diagram above is shown with an optional coolant hose.



# MST ANGLE HEADS - MODULAR NSK MINI SERIES



FIG. 1

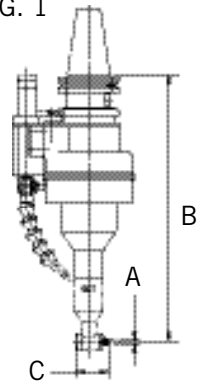


FIG. 2

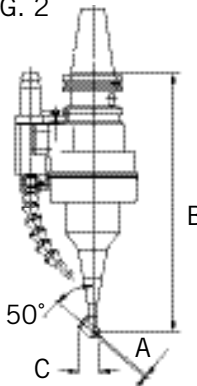


FIG. 3

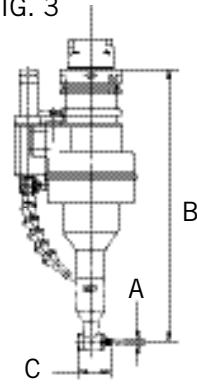


FIG. 4

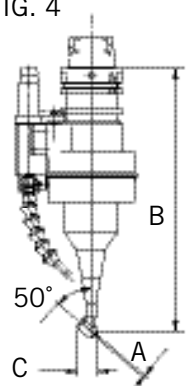


FIG. 5

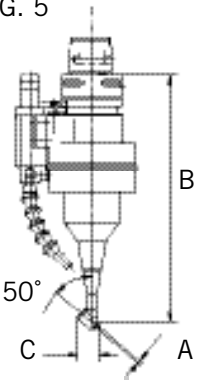
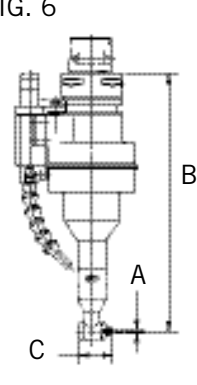


FIG. 6



Note: The diagrams are shown with optional coolant hoses.

## CAT & BT FLANGE TOOL SHANKS

Rotating Direction of Spindle to Angle Axis = CW : CW

ORDER NO.			A MAX.	COLLET TYPE	B*	C	WT (LB.)**	MAX RPM***	FIG.
TAPER	NSK ADAPTER	NSK HEAD							
140 SHANK	159-NSK-3	RA-271E	1/8	CHS	9.78 (9.39)	1.38	11.2	10,000/ 6,667	1
	159-NSK-5				11.78 (11.49)		11.7		
	159-NSK-7				14.03 (13.64)		14.0		
	159-NSK-3	RAX-271E RAX-71E	1/4	CHK	10.45 (10.06)	3.00	11.9		
	159-NSK-5				12.45 (12.06)		12.4		
	159-NSK-7				14.70 (14.31)		14.7		
150 SHANK	159-NSK-3S	RA-200	1/8	CHS	9.58 (9.19)	1.38	11.1		
	159-NSK-5S				11.58 (11.19)		11.6		
	159-NSK-7S				13.83 (13.44)		13.9		
240 SHANK	159-NSK-3SS	IC-300	1/8	CHC	9.22 (8.83)	.86	10,000/ 7,500	1	
		KC-300			9.37 (8.98)			.87	2
		MFC-300M	1/16	K-253	10.83 (10.44)		.37	10,000/ 9,090	1
		MFC-300S			10.83 (10.44)				

Note: NSK Mini Series are for light milling and drilling applications only.

Note: \* means B dimensions in ( ) are for BT40 tool shank.

Note: \*\* means assembly weight with 140 or O63 Shank. For 150 or 100 Shank, add additional 5.5 lb. to the listed weight.

Note: \*\*\* means max machine spindle RPM/max angle head RPM. The max RPM values are for machine spindle/angle axis.

Note: 1/8" collet furnished with RA-271E, RAX-271E, RA-200, IC-300, & KC-300. 1/16" collet furnished with MFC-300M and MFC-300S.

Note: Purchase Common Positioning Block (p32), Shank, NSK Adapters, NSK Mini Angle Attachment, and applicable collets separately. Capto C8 & KM Shanks are available upon request.

# MST ANGLE HEADS - MODULAR NSK MINI SERIES

## HSK FLANGE TOOL SHANKS

Rotating Direction of Spindle to Angle Axis = CW : CW

ORDER NO.			A MAX.	COLLET TYPE	B	C	WT (LBS)**	MAX RPM***	FIG.
TAPER	NSK ADAPTER	NSK HEAD							
063 SHANK	159-NSK-3	RA-271E	1/8	CHS	10.08	1.38	11.2	10,000/ 6,667	3
	159-NSK-5				11.98		11.7		
	159-NSK-7				14.23		14.0		
	159-NSK-3	RAX-271E RAX-71E*	1/4	CHK	10.65	3.00	11.9		
	159-NSK-5				12.65		12.4		
	159-NSK-7				14.90		14.7		
100 SHANK	159-NSK-3S	RA-200	1/8	CHS	9.78	1.38	11.1		
	159-NSK-5S				11.78		11.6		
	159-NSK-7S				14.03		13.9		
159-NSK-3SS	IC-300	IC-300 KC-300	1/8	CHC	9.42	.86	10.7	10,000/ 7,500	3
	KC-300				9.57			.87	4
	MFC-300M	MFC-300M MFC-300S	1/16	K-253 K-252	11.03	.37 .55		10,000/ 9,090	3
	MFC-300S								

## CAPTO FLANGE TOOL SHANKS

Rotating Direction of Spindle to Angle Axis = CW : CW

ORDER NO.			A MAX.	COLLET TYPE	B	C	WT (LB.)	MAX RPM***	FIG.	
TAPER	NSK ADAPTER	NSK HEAD								
C6 SHANK	159-NSK-3	RA-271E	1/8	CHS	9.39	1.38	11.5	10,000/ 6,667	6	
	159-NSK-5				11.39		12.0			
	159-NSK-7				13.64		14.3			
	159-NSK-3	RAX-271E RAX-71E*	1/4	CHK	10.06	3.00	12.2			
	159-NSK-5				12.06		12.7			
	159-NSK-7				14.31		15.0			
	159-NSK-3S	RA-200	1/8	CHS	9.19	1.38	11.4			
	159-NSK-5S				11.19		11.9			
	159-NSK-7S				13.44.		14.2			
	159-NSK-3SS	IC-300	IC-300 KC-300	1/8	CHC	8.83	.86	11.0	10,000/ 7,500	6
		KC-300				8.98			.87	5
		MFC-300M	MFC-300M MFC-300S	1/16	K-253 K-252	10.44	.37 .55		10,000/ 9,090	6
MFC-300S										

Note: \* means the maximum RPM for RAX-71E is 10,000/1,666.

Note: \*\* means assembly weight with 140 or 063 Shank. For 150 or 100 Shank, add additional 5.5 lb. to the listed weight.

Note: \*\*\* means maximum machine spindle RPM/maximum angle head RPM.

Note: The max RPM values are for machine spindle/angle head.

Note: NSK Mini Series are for light milling and drilling applications only.

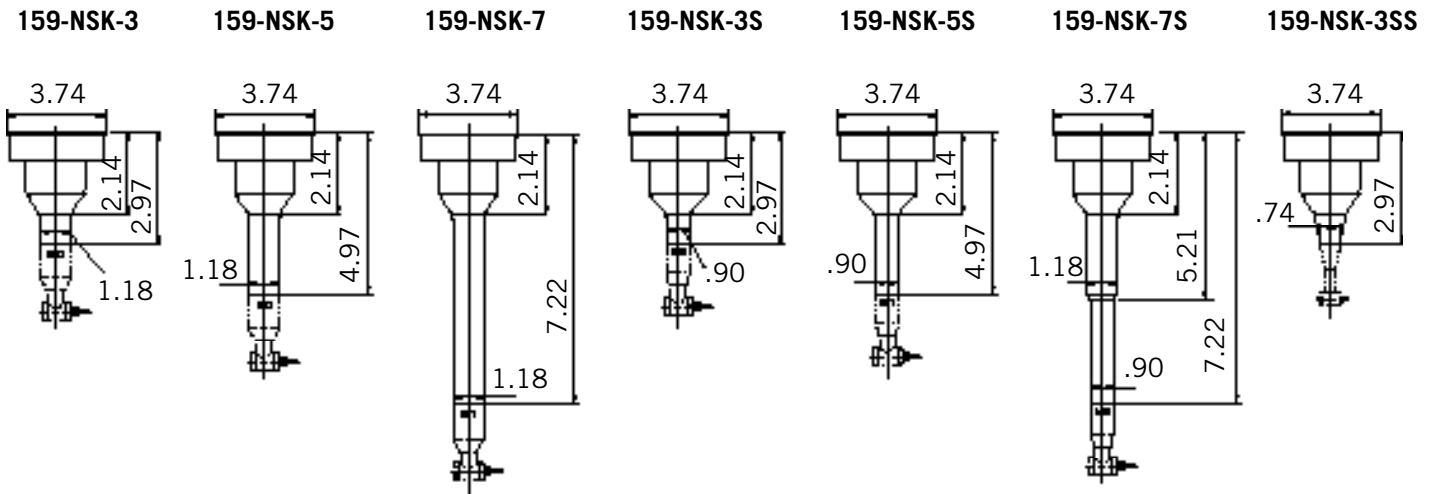
Note: 1/8" collet furnished with RA-271E, RAX-271E, RA-200, IC-300, & KC-300. 1/16" collet furnished with MFC-300M and MFC-300S.

Note: Purchase Common Positioning Block (p32), Shank, NSK Adapters, NSK Mini Angle Attachment, and applicable collets separately. Capto C8 & KM Shanks are available upon request.

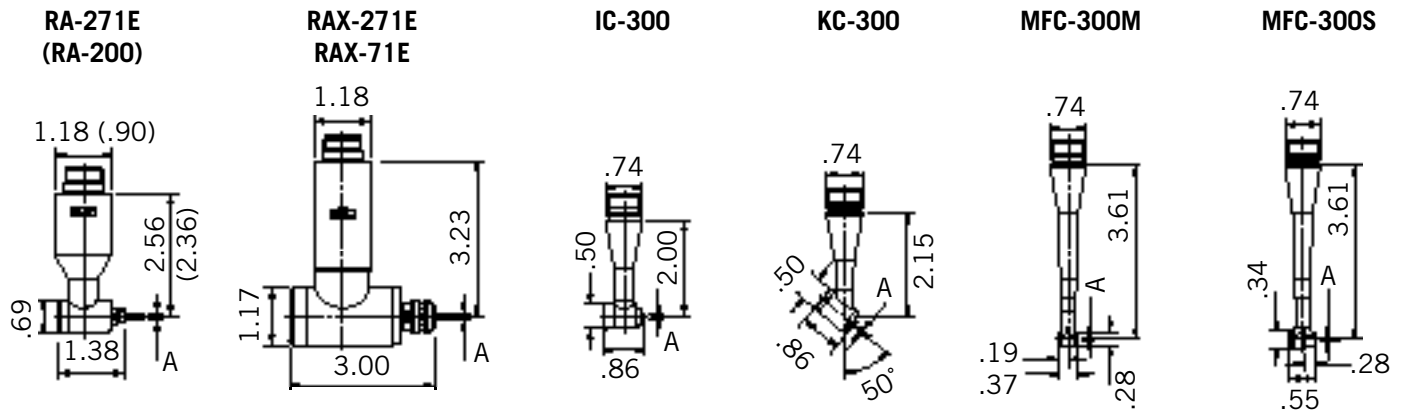
Note: The diagrams are shown with optional coolant hoses.

# MST ANGLE HEADS - MODULAR NSK MINI SERIES

## NSK ADAPTERS (shown with optional NSK Mini Angle Heads)



## NSK MINI ANGLE HEADS

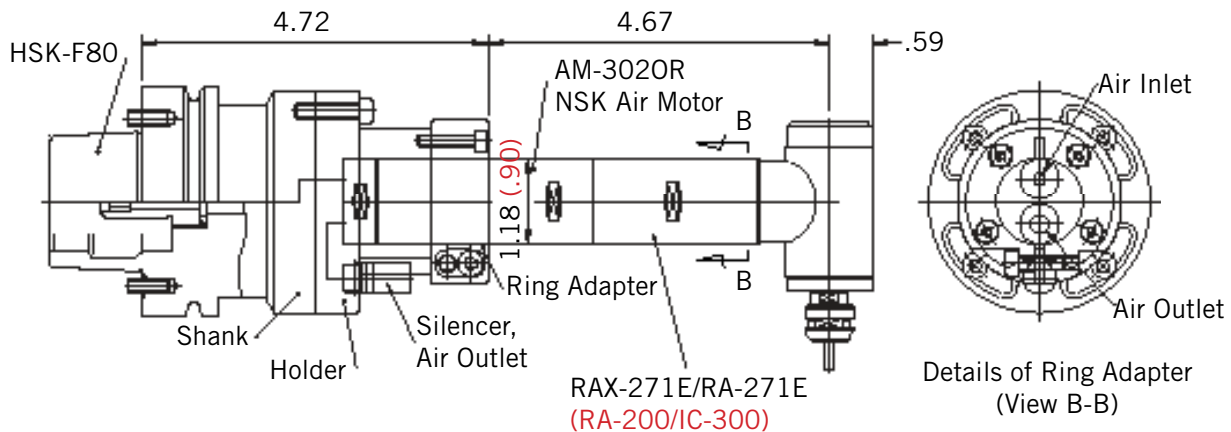


Note: Please purchase Shanks (p4) and NSK Air Spindle units separately.

## F80PD SHANK FOR NSK AIR MOTOR TYPE MINI ANGLE HEADS

### MODEL NO. F80PD-AMH30 (F80PD-AMH22.8)

- Engineered Exclusively for MAKINO MAG-1
- Ideal for Milling and Drilling Operations



Note: The diagram is shown with optional NSK Air Motor and NSK Mini Angle Head.  
Please purchase optional accessories separately.

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

**NEW**



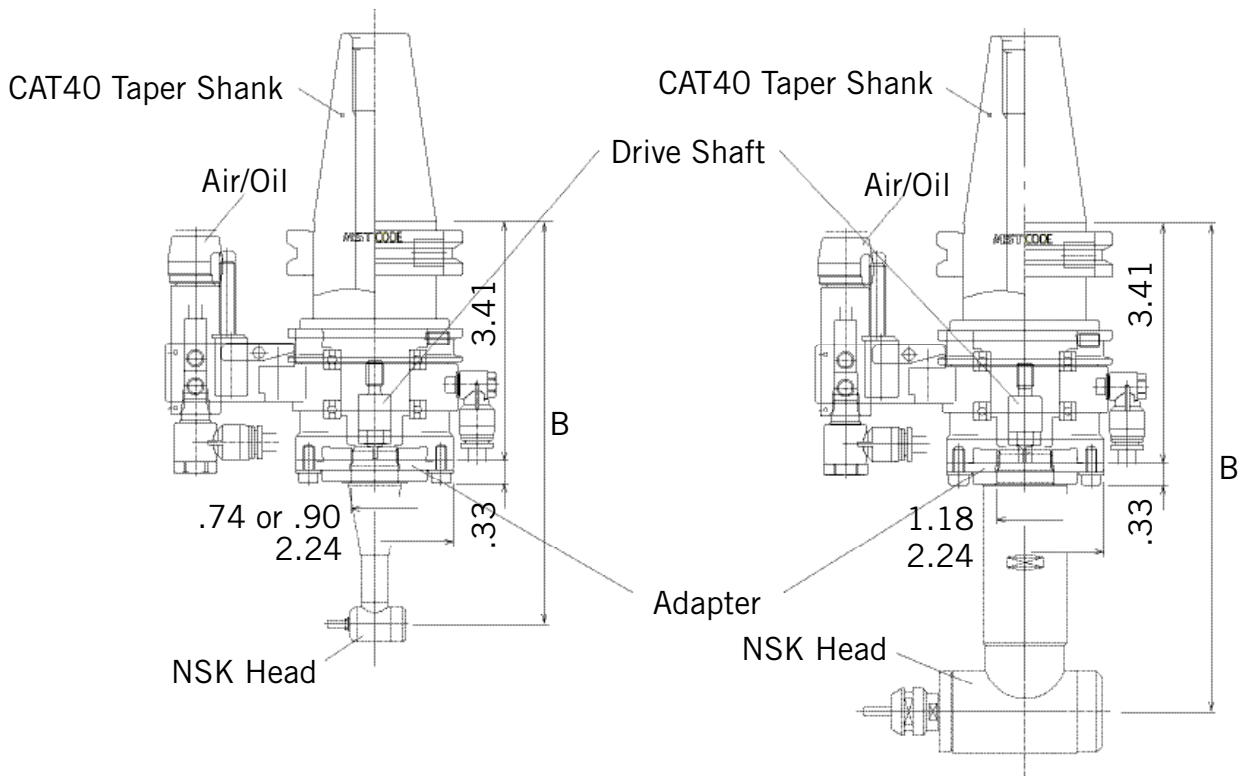
- **NEW AND COMPACT DESIGNS GIVE HIGHER RPM**
- **LIGHT WEIGHT**
- **AIR/OIL LUBRICATION TO MINIMIZE MAINTENANCE AND EXTENDED LIFE OF BEARING ON HIGH SPEED MODULAR SHANK**
- **IDEAL FOR REACHING SMALL MACHINING AREA**

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## CAT40 SHANK

FIG. 1

FIG. 2



### Rotating Direction of M/C Spindle to Angle Axis: CW: CW

CAT40 SHANK	DRIVE SHAFT	ADAPTER	NSK HEAD (GEAR RATIO)	B	MAX. RPM (M/C: NSK HEAD)		FIG.
					AIR/OIL	GREASE	
140H NSK SHANK	NSK-FLT-DRV	NSK-074-ADP	RA-200 (1: .6666)	6.10"	20,000 13,333	16,000 10,666	1
	NSK-FLT-DRV	NSK-074-ADP	IC-300 (1: .750)	5.74"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	KC-300 (1: .750)	5.89"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300M (1: .9091)	7.35"	20,000 18,180	16,000 14,545	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300S (1: .9091)	7.35"	20,000 18,180	16,000 14,545	2
	NSK-PHL-DRV	NSK-118-ADP	RA-271E (1: .6666)	6.30"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-271E (1: .6666)	6.97"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-71E (1: .1666)	6.97"	20,000 3,333	16,000 2,666	

Note: The max RPM values are for machine spindle/angle heads.

Note: 20,000 max RPM is with air/oil lubrication. 16,000 RPM is the max RPM without.

Note: See p22 for NSK Mini Heads. See p22 for air filter/regulator/lubricator.

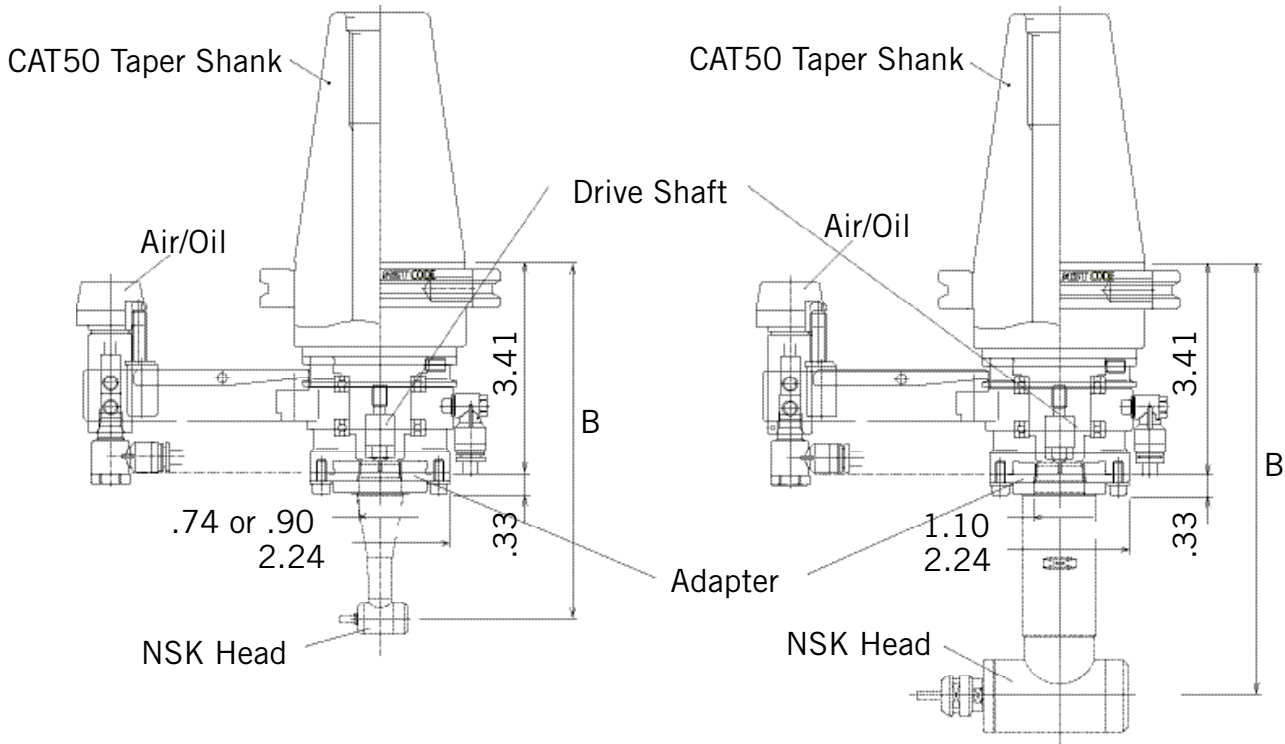


# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## CAT50 SHANK

FIG. 1

FIG. 2



### Rotating Direction of M/C Spindle to Angle Axis: CW:CW

CAT50 SHANK	DRIVE SHAFT	ADAPTER	NSK HEAD (GEAR RATIO)	B	MAX. RPM (M/C: NSK HEAD)	FIG.
150H NSK SHANK	NSK-FLT-DRV	NSK-074-ADP	RA-200 (1: .6666)	6.10"	15,000 10,000	1
	NSK-FLT-DRV	NSK-074-ADP	IC-300 (1: .750)	5.74"	15,000 11,250	
	NSK-FLT-DRV	NSK-074-ADP	KC-300 (1: .750)	5.89"	15,000 11,250	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300M (1: .9091)	7.35"	15,000 13,635	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300S (1: .9091)	7.35"	15,000 13,635	
	NSK-PHL-DRV	NSK-118-ADP	RA-271E (1: .6666)	6.30"	15,000 10,000	2
	NSK-PHL-DRV	NSK-118-ADP	RAX-271E (1: .6666)	6.97"	15,000 10,000	
	NSK-PHL-DRV	NSK-118-ADP	RAX-71E (1: .1666)	6.97"	15,000 2,500	

Note: The max RPM values are for machine spindle/angle heads.

Note: 15,000 max RPM is with and without air/oil lubrication.

Note: See p22 for NSK Mini Heads. See p22 for air filter/regulator/lubricator.

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## *BT30 SHANK*

FIG. 1

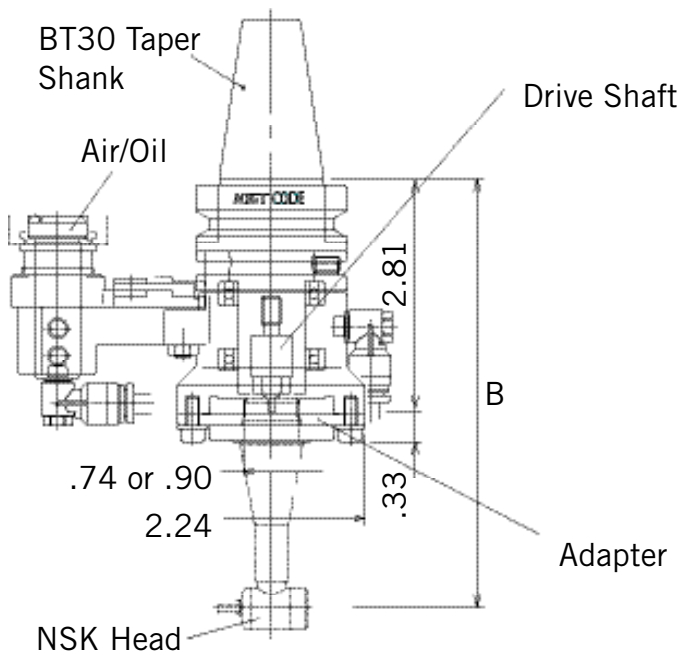
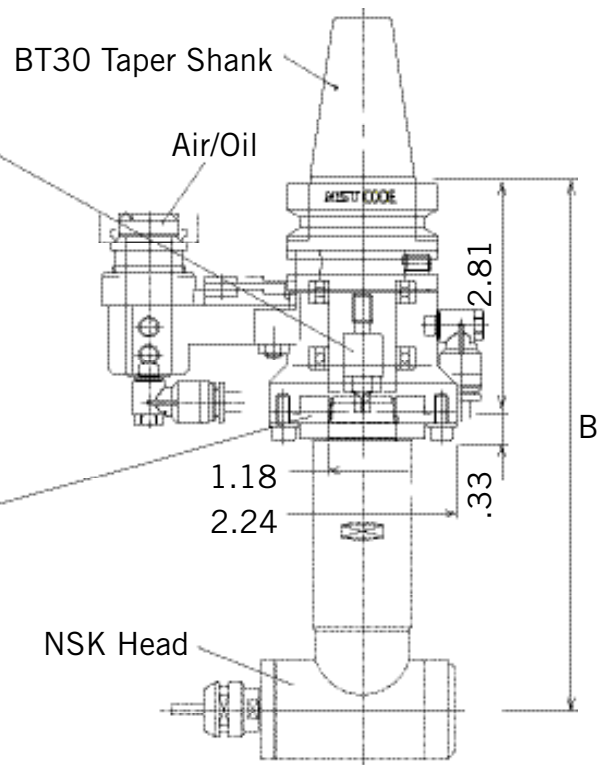


FIG. 2



### Rotating Direction of M/C Spindle to Angle Axis: CW: CW

BT30 SHANK	DRIVE SHAFT	ADAPTER	NSK HEAD (GEAR RATIO)	B	MAX. RPM (M/C: NSK HEAD)		FIG.
					AIR/OIL	GREASE	
230H NSK SHANK	NSK-FLT-DRV	NSK-074-ADP	RA-200 (1: .6666)	5.51"	20,000 13,333	16,000 10,666	1
	NSK-FLT-DRV	NSK-074-ADP	IC-300 (1: .750)	5.15"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	KC-300 (1: .750)	5.30"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300M (1: .9091)	6.76"	20,000 18,180	16,000 14,545	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300S (1: .9091)	6.76"	20,000 18,180	16,000 14,545	2
	NSK-PHL-DRV	NSK-118-ADP	RA-271E (1: .6666)	5.71"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-271E (1: .6666)	6.38"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-71E (1: .1666)	6.38"	20,000 3,333	16,000 2,666	

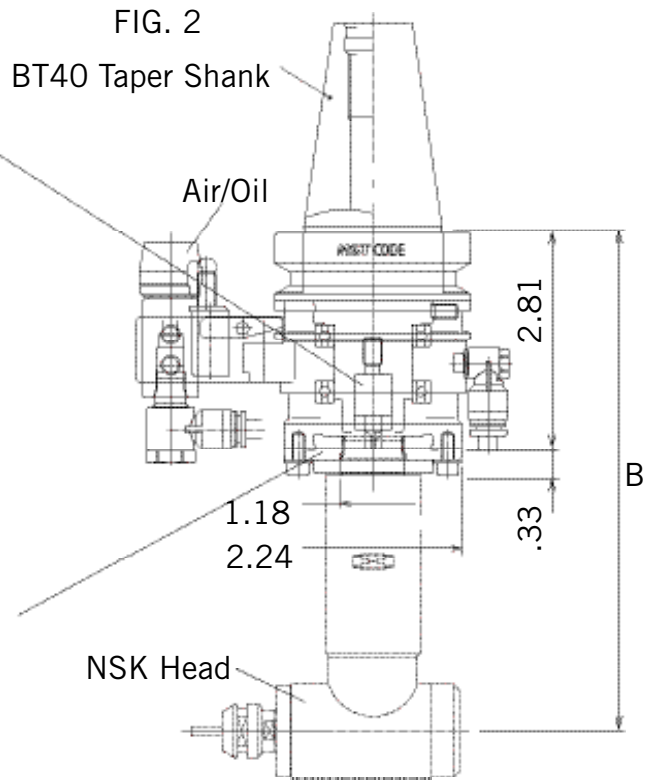
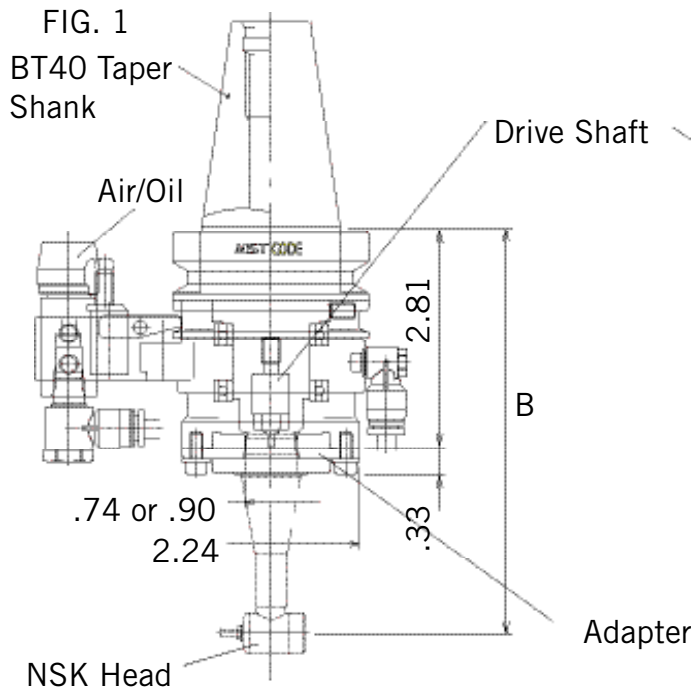
Note: The max RPM values are for machine spindle/angle heads.

Note: 20,000 max RPM is with air/oil lubrication. 16,000 RPM is the max RPM without.

Note: See p22 for NSK Mini Heads. See p22 for air filter/regulator/lubricator.

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## BT40 SHANK



### Rotating Direction of M/C Spindle to Angle Axis: CW:CW

BT40 SHANK	DRIVE SHAFT	ADAPTER	NSK HEAD (GEAR RATIO)	B	MAX. RPM (M/C: NSK HEAD)		FIG.
					AIR/OIL	GREASE	
240H NSK SHANK	NSK-FLT-DRV	NSK-074-ADP	RA-200 (1: .6666)	5.51"	20,000 13,333	16,000 10,666	1
	NSK-FLT-DRV	NSK-074-ADP	IC-300 (1: .750)	5.15"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	KC-300 (1: .750)	5.30"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300M (1: .9091)	6.76"	20,000 18,180	16,000 14,545	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300S (1: .9091)	6.76"	20,000 18,180	16,000 14,545	2
	NSK-PHL-DRV	NSK-118-ADP	RA-271E (1: .6666)	5.71"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-271E (1: .6666)	6.38"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-71E (1: .1666)	6.38"	20,000 3,333	16,000 2,666	

Note: The max RPM values are for machine spindle/angle heads.

Note: 20,000 max RPM is with air/oil lubrication. 16,000 RPM is the max RPM without.

Note: See p22 for NSK Mini Heads. See p22 for air filter/regulator/lubricator.

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## HSK A63 SHANK

FIG. 1

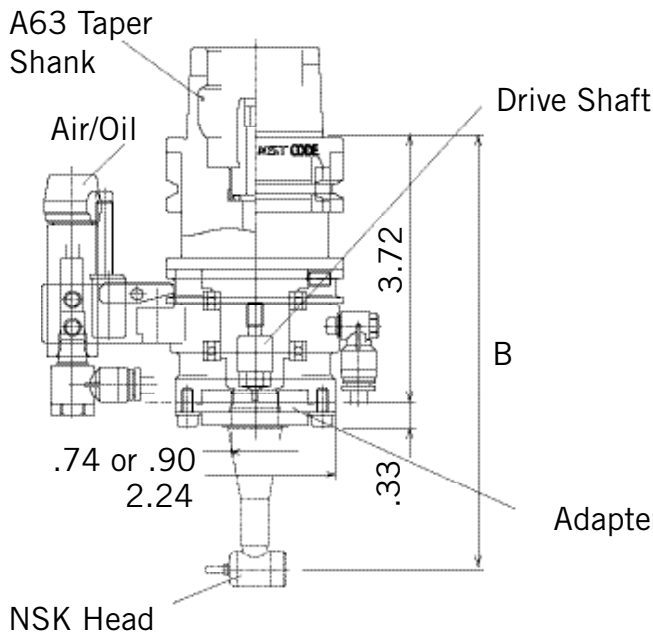
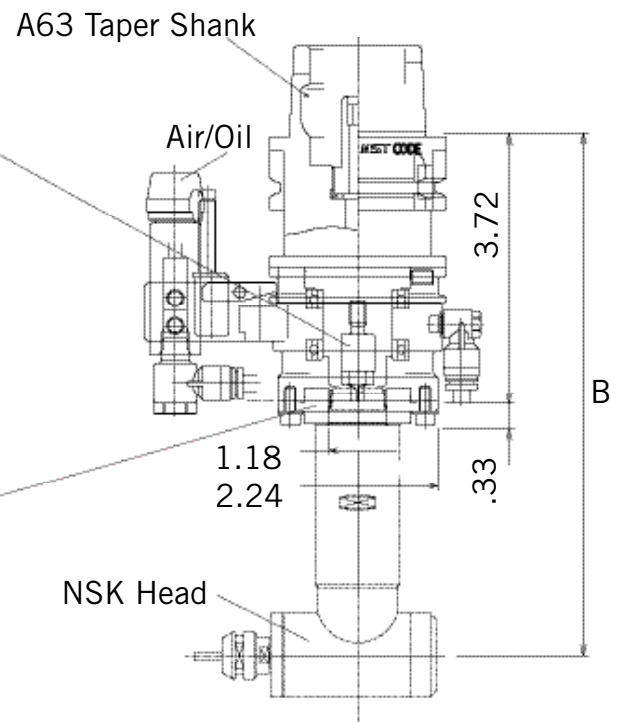


FIG. 2



### Rotating Direction of M/C Spindle to Angle Axis: CW: CW

A63 SHANK	DRIVE SHAFT	ADAPTER	NSK HEAD (GEAR RATIO)	B	MAX RPM (MC: NSK HEAD)		FIG.
					AIR/OIL	GREASE	
063H NSK SHANK	NSK-FLT-DRV	NSK-074-ADP	RA-200 (1: .6666)	6.42"	20,000 13,333	16,000 10,666	1
	NSK-FLT-DRV	NSK-074-ADP	IC-300 (1: .750)	6.06"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	KC-300 (1: .750)	6.21"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300M (1: .9091)	7.67"	20,000 18,180	16,000 14,545	2
	NSK-FLT-DRV	NSK-074-ADP	MFC-300S (1: .9091)	7.67"	20,000 18,180	16,000 14,545	
	NSK-PHL-DRV	NSK-118-ADP	RA-271E (1: .6666)	6.62"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-271E (1: .6666)	7.29"	20,000 13,333	16,000 10,666	
NSK-PHL-DRV	NSK-118-ADP	RAX-71E (1: .1666)	7.29"	20,000 3,333	16,000 2,666		

Note: The max RPM values are for machine spindle/NSK angle heads.

Note: 20,000 max RPM is with air/oil lubrication. 16,000 RPM is the max RPM without.

Note: See p22 for NSK Mini Heads. See p22 for air filter/regulator/lubricator.

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## HSK A100 SHANK

FIG. 1

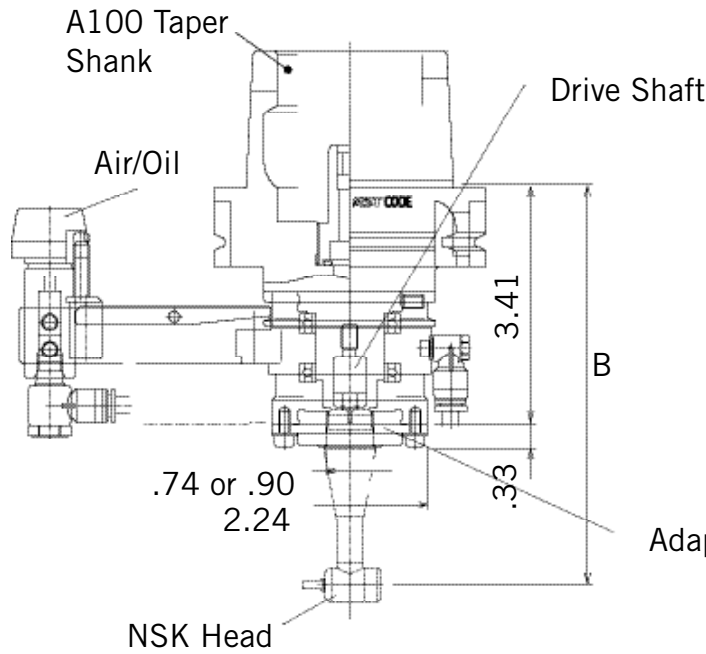
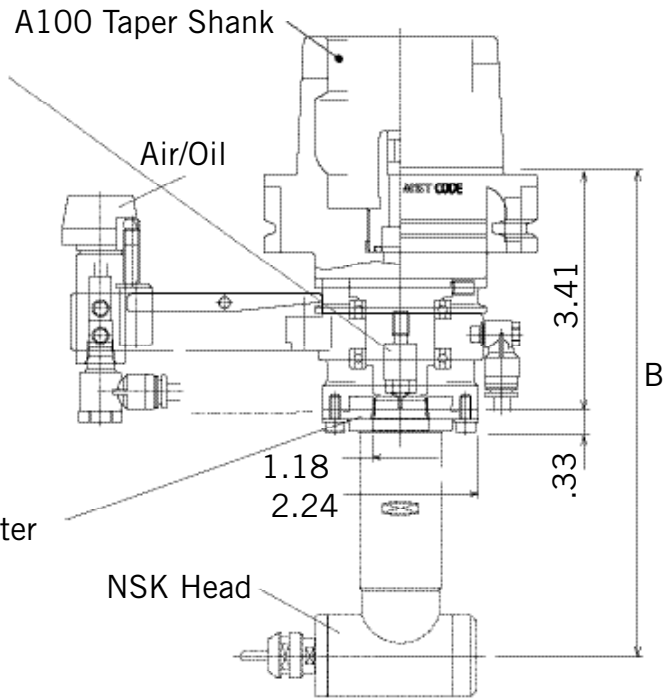


FIG. 2



### Rotating Direction of M/C Spindle to Angle Axis: CW: CW

A100 SHANK	DRIVE SHAFT	ADAPTER	NSK HEAD (GEAR RATIO)	B	MAX. RPM (M/C: NSK HEAD)	FIG.
100H NSK SHANK	NSK-FLT-DRV	NSK-074-ADP	RA-200 (1: .6666)	6.10"	15,000 10,000	1
	NSK-FLT-DRV	NSK-074-ADP	IC-300 (1: .750)	5.74"	15,000 11,250	
	NSK-FLT-DRV	NSK-074-ADP	KC-300 (1: .750)	5.89"	15,000 11,250	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300M (1: .9091)	7.35"	15,000 13,635	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300S (1: .9091)	7.35"	15,000 13,635	2
	NSK-PHL-DRV	NSK-118-ADP	RA-271E (1: .6666)	6.30"	15,000 10,000	
	NSK-PHL-DRV	NSK-118-ADP	RAX-271E (1: .6666)	6.97"	15,000 10,000	
	NSK-PHL-DRV	NSK-118-ADP	RAX-71E (1: .1666)	6.97"	15,000 2,500	

Note: The max RPM values are for machine spindle/angle heads.

Note: 15,000 max RPM is with and without air/oil lubrication.

Note: See p22 for NSK Mini Heads. See p22 for air filter/regulator/lubricator.



# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## *CAPTO C6 SHANK*

FIG. 1

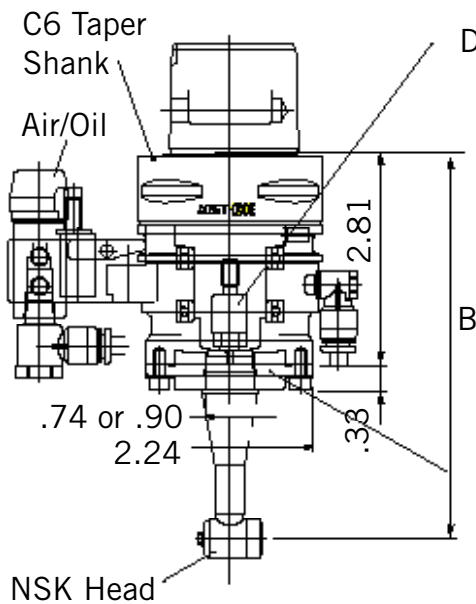
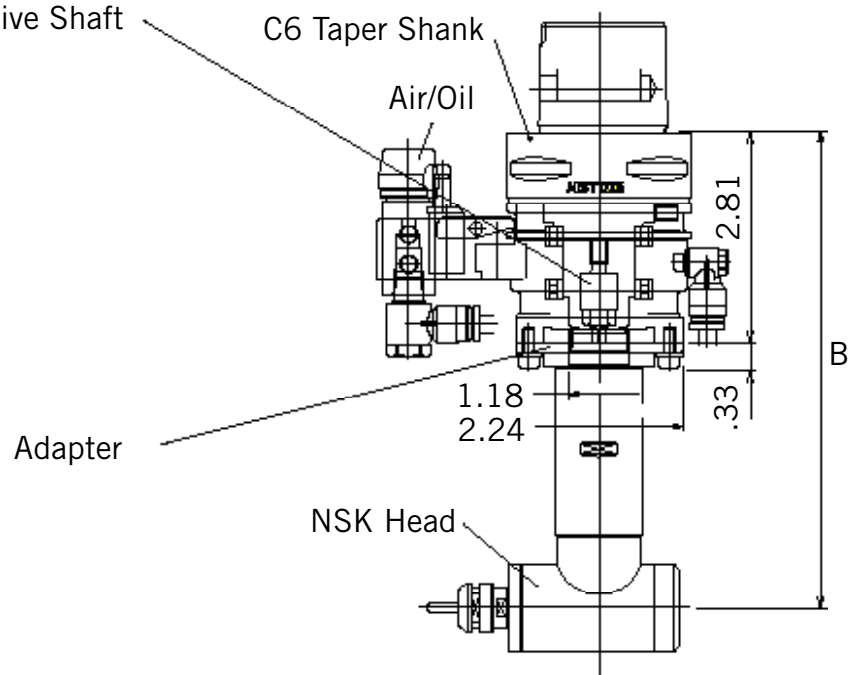


FIG. 2



### Rotating Direction of M/C Spindle to Angle Axis: CW: CW

C6 SHANK	DRIVE SHAFT	ADAPTER	NSK HEAD (GEAR RATIO)	B	MAX. RPM (M/C: NSK HEAD)		FIG.
					AIR/OIL	GREASE	
C6H NSK SHANK	NSK-FLT-DRV	NSK-074-ADP	RA-200 (1: .6666)	5.51"	20,000 13,333	16,000 10,666	1
	NSK-FLT-DRV	NSK-074-ADP	IC-300 (1: .750)	5.15"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	KC-300 (1: .750)	5.30"	20,000 15,000	16,000 12,000	
	NSK-FLT-DRV	NSK-074-ADP	MFC-300M (1: .9091)	6.76"	20,000 18,180	16,000 14,545	2
	NSK-FLT-DRV	NSK-074-ADP	MFC-300S (1: .9091)	6.76"	20,000 18,180	16,000 14,545	
	NSK-PHL-DRV	NSK-118-ADP	RA-271E (1: .6666)	5.71"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-271E (1: .6666)	6.38"	20,000 13,333	16,000 10,666	
	NSK-PHL-DRV	NSK-118-ADP	RAX-71E (1: .1666)	6.38"	20,000 3,333	16,000 2,666	

Note: The max RPM values are for machine spindle/angle heads.

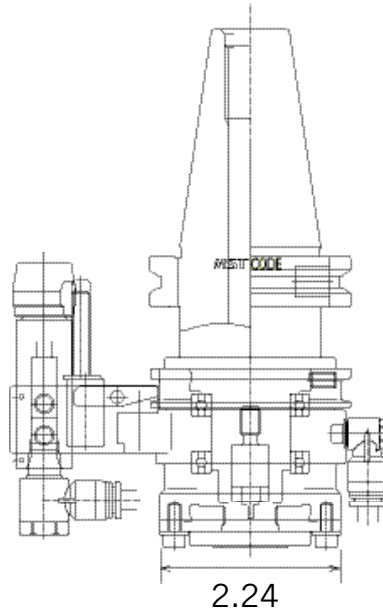
Note: 20,000 max RPM is with air/oil lubrication. 16,000 max RPM is without air/oil lubrication.

Note: See p22 for NSK Mini Heads. See p22 for air filter/regulator/lubricator.

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

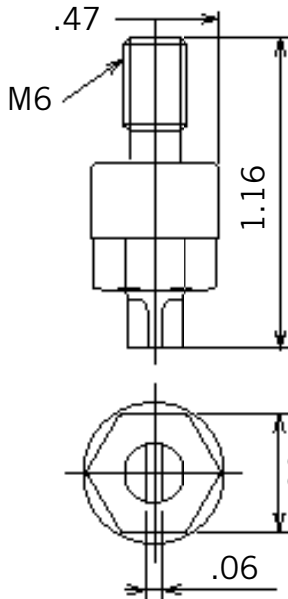
## SHANK, DRIVE SHAFTS AND ADAPTERS

### HIGH SPEED MODULAR SHANK

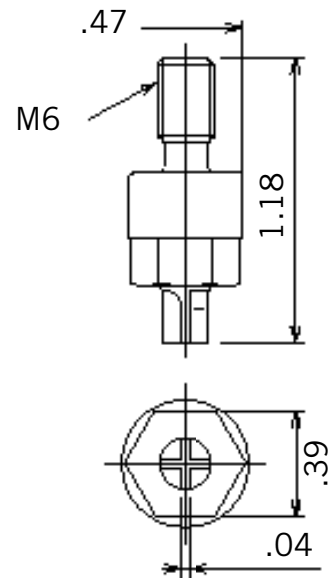


### DRIVE SHAFTS

*NSK-FLT-DRV*



### *NSK-PHL-DRV*

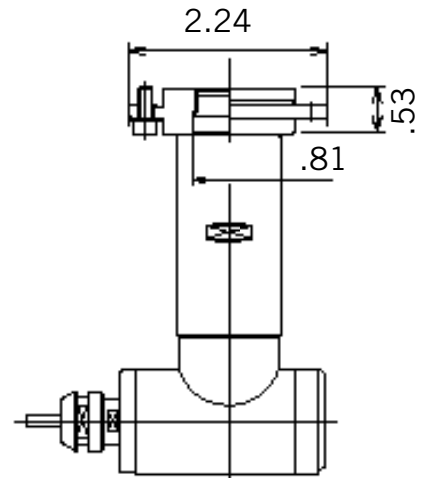
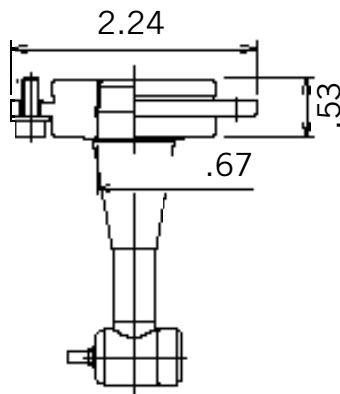


### ADAPTERS

#### *NSK-074-ADP*



#### *NSK-118-ADP*



### NSK MINI HEADS

- RA-200*
- IC-300*
- KC-300*
- MFC-300M*
- MFC-300S*

- RA-271E*
- RAX-271E*
- RAX-71E*

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS EXTENDED ADAPTERS

FIG. 1

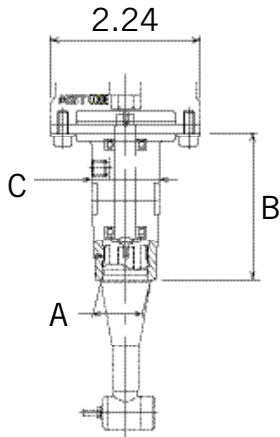


FIG. 2

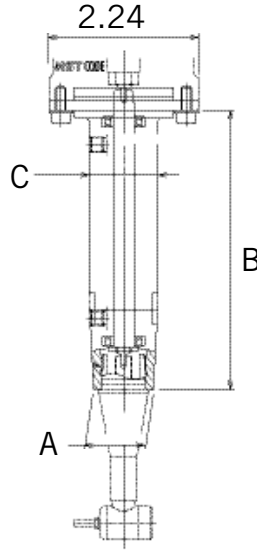
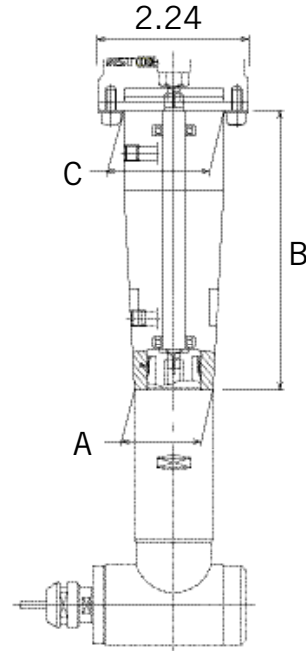


FIG. 3



EXTENDED ADAPTERS	A	B	C	NSK HEAD		FIG.
NSK-074-EXT2	.900	2.34	1.024	RA-200	MFC-300M	1
NSK-074-EXT4	.900	4.35	1.024	IC-300	MFC-300S	2
NSK-118-EXT2	1.181	2.34	1.412	RA-271E		1
NSK-118-EXT4	1.181	4.35	1.496	RAX-271E		3
				RAX-71E		

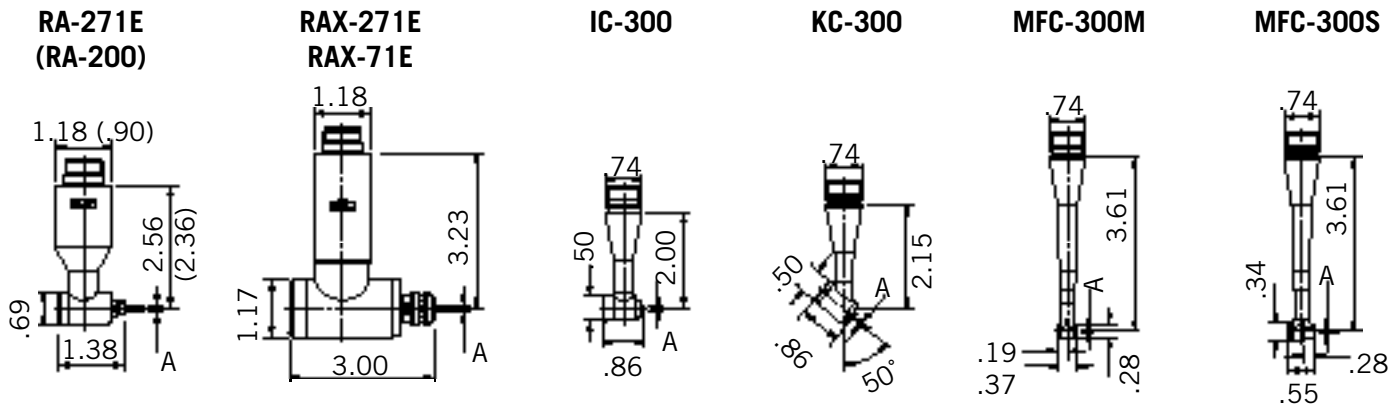
## MAX RPM WITH EXTENDED ADAPTERS

SHANK	EXTENDED ADAPTERS	MOST POPULAR NSK HEADS	MAX. RPM (M/C: NSK HEAD)	
			AIR/OIL	GREASE
CAT40 BT30 BT40 HSK A63 CAPTO C6	NSK-074-EXT2	IC-300 (1 : .750)	20,000	16,000
	NSK-074-EXT4		15,000	12,000
	NSK-118-EXT2	RAX-271E (1 : .6666)	12,000	12,000
	NSK-118-EXT4		8,000	8,000
CAT50 HSK A100	NSK-074-EXT2	IC-300 (1 : .750)	10,000	10,000
	NSK-074-EXT4		6,666	6,666
	NSK-118-EXT2	RAX-271E (1 : .6666)	15,000	15,000
	NSK-118-EXT4		11,250	11,250
			12,000	12,000
			8,000	8,000
			10,000	10,000
			6,666	6,666

Max RPM for NSK other heads: Please refer to p22 to find the gear ratio to calculate max rpm on other NSK Mini Heads.

# MST HIGH SPEED MODULAR SHANKS FOR NSK MINI HEADS

## NSK MINI ANGLE HEADS



ORDER NO. NSK HEAD	REDUCTION GEAR RATIO	A MAX.	COLLET TYPE
RA-271E	1 : .6666	1/8	CHS
RAX-271E	1 : .6666	1/4	CHK
RAX-71E	1 : .1666	1/4	CHK
RA-200	1 : .6666	1/8	CHS
IC-300	1 : .750	1/8	CHC
KC-300	1 : .750	1/8	CHC
MFC-300M	1 : .9091	1/16	K-253
MFC-300S	1 : .9091	1/16	K-252

Note: 1/8" collet is furnished with RA-271E, RAX-271E, RA-200, IC-300, KC-300.  
 1/16" collet is furnished with MFC-300M and MFC-300S.

### A Sample of Air Filter/Regulator/Lubricator

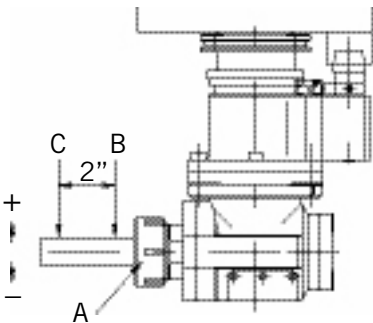


Photo courtesy of SMC.

# MST ANGLE HEADS - SOLID & FLANGE SERIES



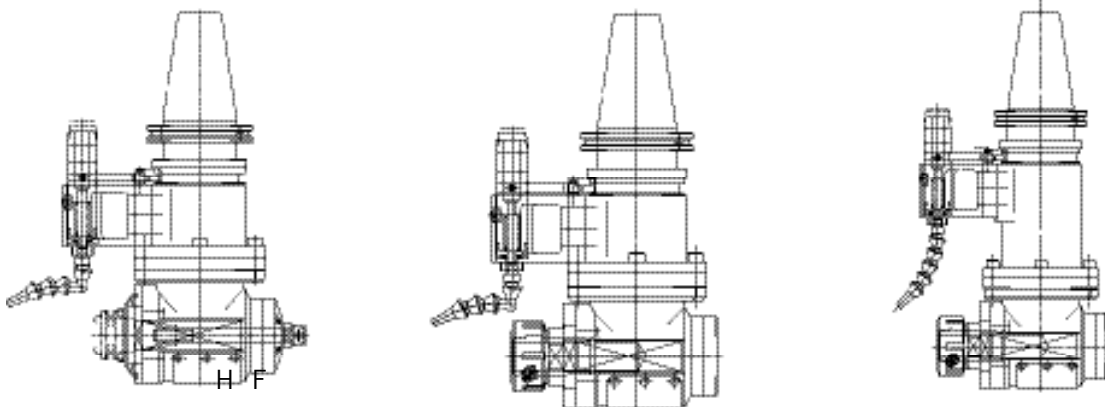
- HARDENED PRECISION SPIRAL BEVEL GEAR FOR OPTIMUM PERFORMANCE
- AVAILABLE IN 3 ANGLE SHAFT CONFIGURATIONS: TG100, ER32 COLLET, AND BT30 MASTER HOLDER TYPE FOR SOLID SERIES
- AVAILABLE IN 3 ANGLE SHAFT CONFIGURATIONS: TG100 COLLET, BT30 MASTER HOLDER TYPE, AND CAT40 MASTER HOLDER TYPE FOR FLANGE SERIES
- THE FLANGE SERIES IS BOLTED DIRECTLY ON THE MACHINE SPINDLE FACE FOR MAX. RIGIDITY
- CUTTING DIRECTION ANYWHERE FROM 0° TO 360°
- COMPACT ANGLE HEAD DESIGN AND RUGGED BODY CONSTRUCTION
- SUPERIOR PRECISION



## GUARANTEED ACCURACIES

Cavity at Bore	A	.0002" TIR
Test Bar at Face	B	.0004" TIR
Test Bar at 2"	C	.0006" TIR
Deviation of Angle (high or low of C under B = 0)	90°	±.0004" TIR

- EXTERNAL COOLANT SUPPLY PORT FOR MOST MODELS



Note: The diagrams are shown with optional coolant hoses.



# MST ANGLE HEADS - SOLID & FLANGE SERIES

## DIMENSIONS AND SPECIFICATIONS

FIG. 1

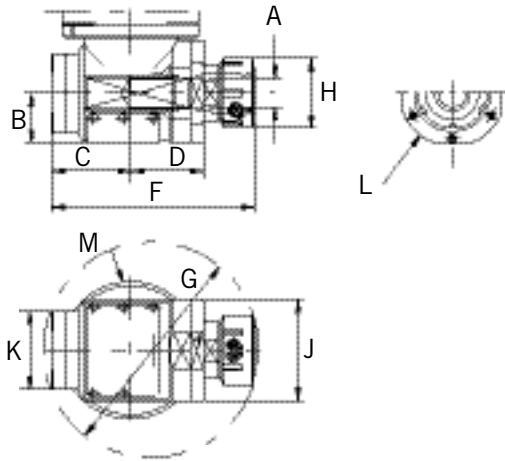


FIG. 2

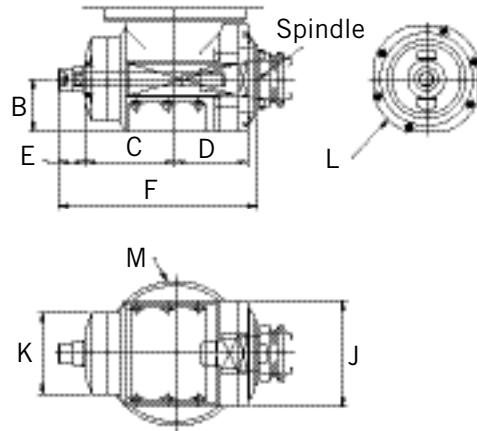
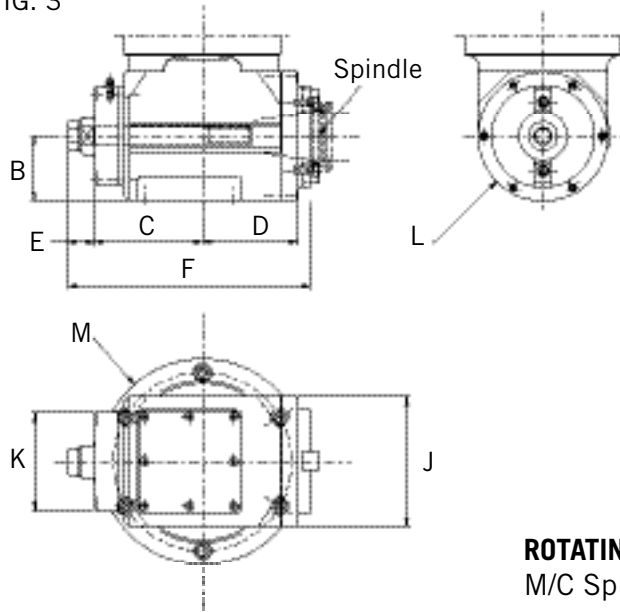


FIG. 3



### ROTATING DIRECTION

M/C Spindle to Angle Axis = CCW: CW

MODEL	SPINDLE	A	B	C	D*	E	F	G	H
160	TG100	.093-1.000	1.73	2.76	2.56	—	7.09	7.60	2.50
161	ER32	.039-.787	1.57	2.56	2.20	—	6.30	6.70	1.97
163D	BT30	—	1.73	3.01	2.42	.89	6.65	—	—
166	CAT40*	—	2.36	3.94	3.46	.98	8.86	—	—

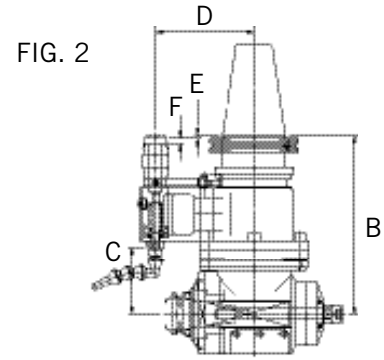
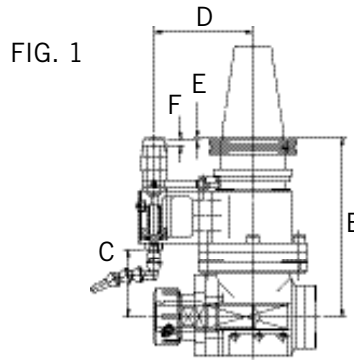
  

MODEL	J	K	L	∅M	GEAR RATIO OF SPINDLE: ANGLE AXIS	FIG.
160	3.54	2.76	3.70	4.80	1: .96	1
161	3.46	2.56	3.54	3.86	1: .81	1
163D	3.50	2.76	3.70	4.80	1: .96	2
166	4.72	3.58	4.72	7.48	1: .90	3

Note: \* means BT40 configuration is available upon request.

# MST ANGLE HEADS - SOLID & FLANGE SERIES

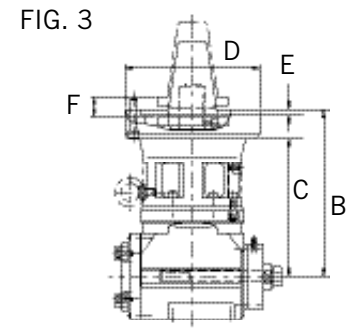
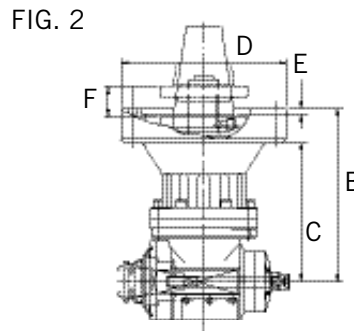
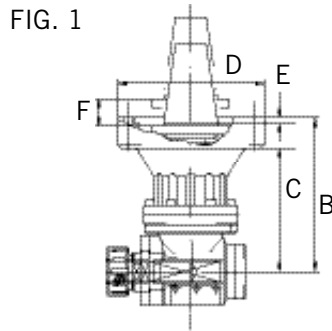
## SOLID SERIES



Note: The diagrams are shown with optional coolant hoses.

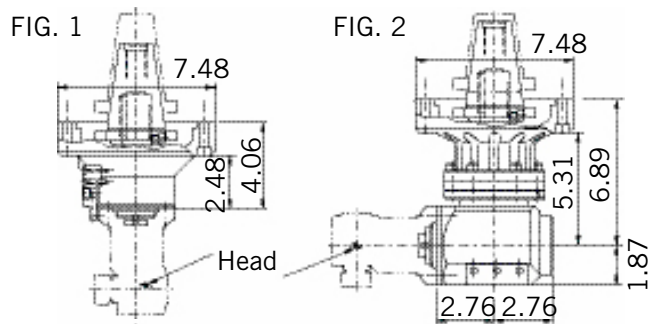
TAPER	ORDER NO.	MODEL	B	C	D	E	F (COMPRESSION)	MAX RPM*	WT (LB.)	FIG.
CAT40	140-161-7	161	6.89	2.17	2.56	0	.24	3,000/2,430	16.6	1
CAT50	150-160-8	160	7.87	2.95	4.33	.12		2,500/2,400	29.8	
	150-160-10		10.11	5.08	4.33	.12		2,500/2,400	33.5	
	150-163D-8	163D	7.87	2.95	4.33	.12		2,500/2,400	32.5	2
BT40	240-161-6	161	6.30	2.48	2.56	0		3,000/2,430	16.1	1

## FLANGE SERIES



TAPER	ORDER NO.	MODEL	B	C	D	E	F	MAX RPM*	WT (LB.)	FIG.
CAT50	350-160-8	160	7.87	6.30	7.48	.28	1.38	2,500/2,400	40.7	1
	350-160-14	160	13.78	12.20					62.9	
	350-163D-8	163D	7.87	6.30					43.3	2
	350-163D-14	163D	13.78	12.20					65.6	
	350-166-9	166	9.25	7.68			1.1	2,200/1,980	73.0	3

## FLANGE SHANK FOR MODULAR HEADS



TAPER	ORDER NO.	MAX RPM*	WT (LB.)	FIG.
CAT40	340 SHANK	6,000	17.0	1
CAT50	350 SHANK	6,000	25.0	
		350 PARALLEL	2,000	42.0

Note: Purchase Modular Heads separately.

Note: Purchase Common Positioning Block (p32) separately for Solid Series.

Note: Purchase BT30 and CAT40 Adapters separately. Please visit [www.tecnaratools.com](http://www.tecnaratools.com) for more info.

Note: Mounting Plate is furnished as a standard accessory. 340 Type comes with F-160 and 350 Type comes with F-190.

Note: Mounting plate must be machined to fit a specific machine.

Note: \* means max machine spindle RPM/max angle axis RPM.

Note: Capto & KM Shanks are available upon request for Solid Series only.

# MST ANGLE HEADS - NUT FOR COOLANT THRU THE CUTTER

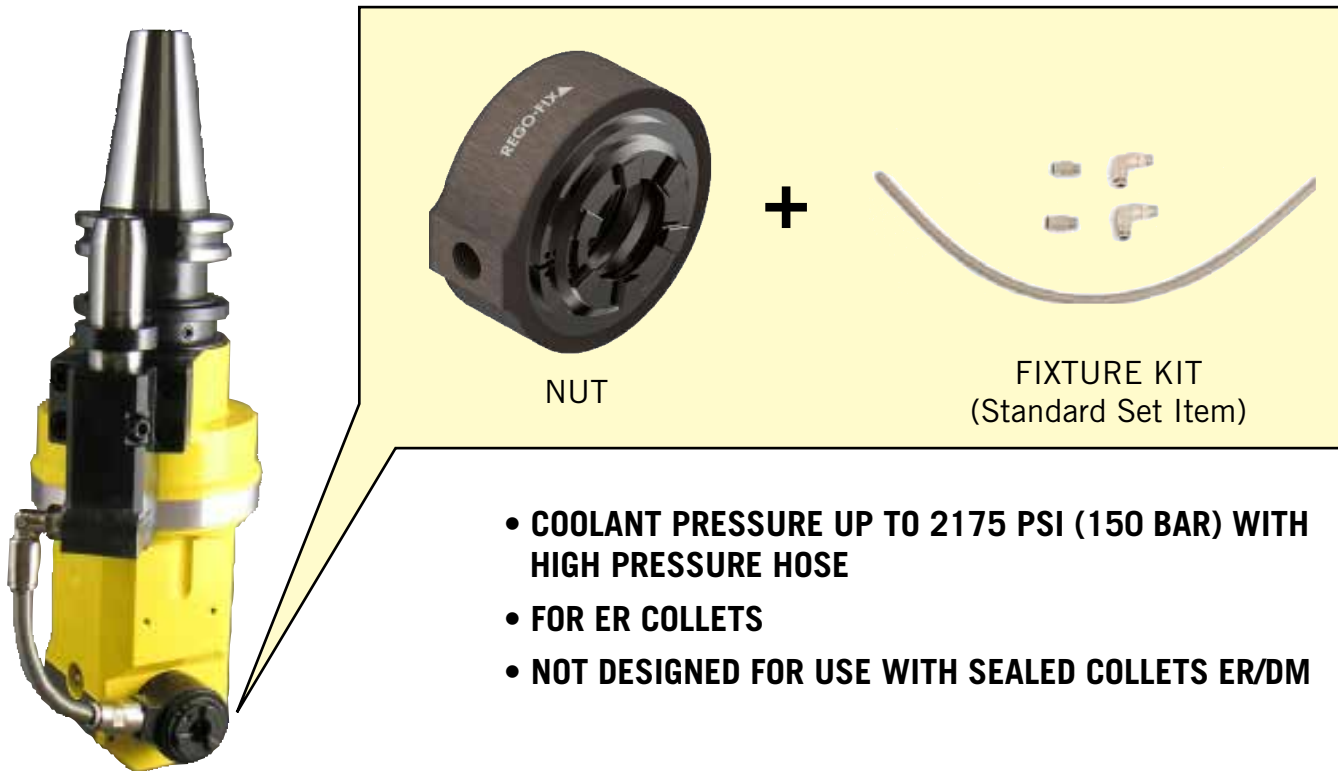
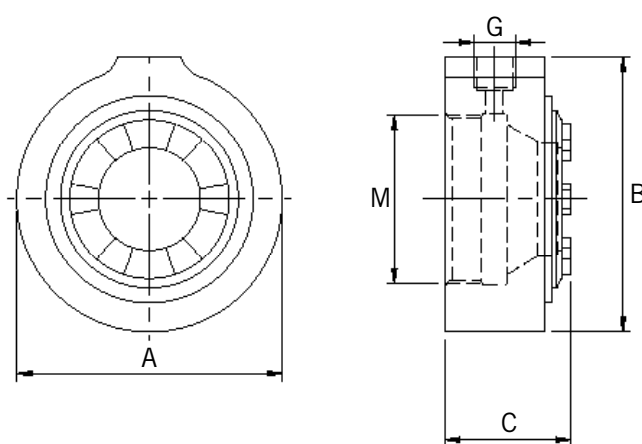
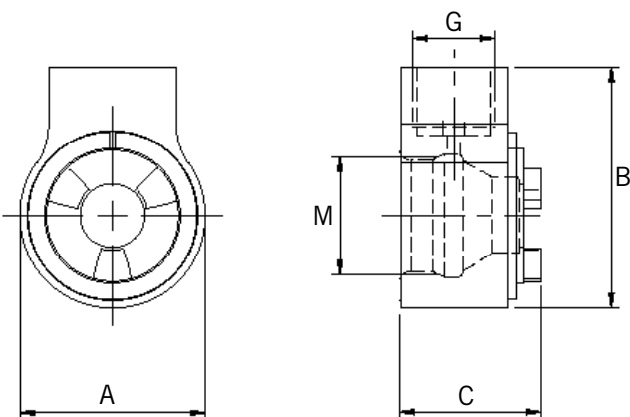


FIG. 1

FIG. 2



## COOLANT THRU THE CUTTER NUT (CTCN)

ORDER NO.	A	B	C	M	G	ANGLE HEADS	FIG.
CTCN-102	.86	1.12	.65	M14 x 0.75	1/8	#164	1
CTCN-103	1.34	1.56	.96	M22 x 1.5		#162	1
CTCN-107	1.57	1.75	1.02	M25 x 1.5		#159	1
CTCN-109	2.46	2.55	1.16	M40 x 1.5		#161	2

# MST ANGLE HEADS - HALF SERIES



- **COMPACT AND LIGHT WEIGHT DESIGN**
- **CAST IRON HOUSING FOR MAXIMUM RIGIDITY**
- **IDEAL FOR DRILLING, AND LIGHT MILLING APPLICATIONS**

### GEAR RATIO

M/C Spindle to Angle Head = 1 : 1 for Models 152 & 154  
1 : 0.83 for Model 156

### ROTATING DIRECTION

M/C Spindle to Angle Axis = CCW: CW

## FOR DRILLING & LIGHT MILLING APPLICATIONS

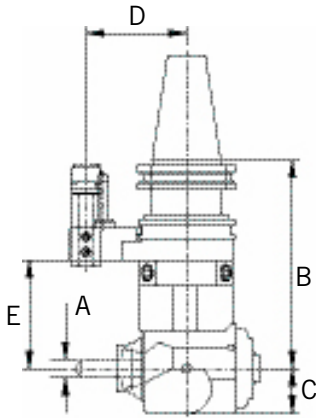


FIG. 1

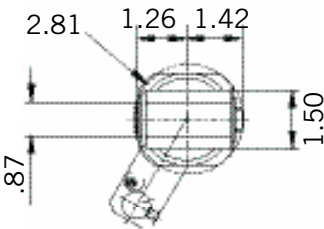


FIG. 2

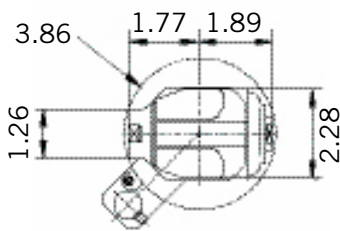
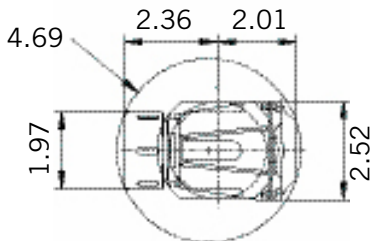


FIG. 3



SHANK	ORDER NO.	RANGE A COLLET	B	C	D	E	MAX RPM*	WT (LB.)	FIG.
CAT40	140-152-5	.039-.276	5.31	.75	2.56	2.76	6,000	6.8	1
	140-152-8	#070	7.68			5.12		7.5	
	140-154-5	.098-.512	5.31	1.14		2.76	4,000	8.2	2
	140-154-8	#120	7.68			5.12		11.0	
	140-156-6	.250-.750	5.91	1.26		3.03	6,000	10.4	3
140-156-8	#116	8.27	5.39		12.8				
CAT50	150-152-8	.039-.276	7.68	.75	4.33	5.12	6,000	13.0	1
	150-152-10	#070	10.04			7.48		13.8	
	150-154-5	.098-.512 #120	5.31	1.14		2.76	4,000	12.8	2
	150-154-8		7.68			5.12		15.7	
	150-154-10		10.04			7.48		18.5	
	150-156-6	.250-.750 #116	5.91	1.26		3.03	6,000	15.0	3
150-156-8	8.27		5.39		17.6				
150-156-11	10.63		7.76		20.0				
BT30	230-152L-5	.039-.276 #070	4.72	.75	1.97/ 2.56	2.56	6,000	4.0	1
	230-154-5	.098-.512 #120	4.80	1.14		2.76		4,000	6.4
BT40	240-152-5	.039-.276	4.72	.75	2.56	2.76	6,000	6.6	1
	240-152-7	#070	7.09			5.12		7.3	
	240-154-5	.098-.512 #120	4.72	1.14		2.76	4,000	7.9	2
	240-154-7		7.09			5.12		10.8	
	240-156-5	.250-.750 #116	5.31	1.26		3.03	6,000	9.9	3
240-156-8	7.68		5.39		12.3				
HSK 63A	063-152-7	.039-.276	7.21	.75	2.56	5.12	6,000	7.7	1
	063-152-10	#070	9.57			7.48		8.5	
	063-154-5	.098-.512 #120	4.84	1.14		2.76	4,000	7.3	2
	063-154-7		7.21			5.12		10.4	
	063-154-10		9.57			7.48		13.2	
	063-156-8	.250-.750 #116	7.8	1.26		5.39	6,000	11.9	3
063-156-10	10.16		7.76		14.3				

Note: BT30 Half unit is furnished with straight positioning pins. The Common Positioning Block for BT30 Half is HB-01.

Note: Purchase Common Positioning Block (p32) and applicable collets (p33) separately.

Note: \* means maximum machine spindle RPM.

Note: Capto & KM Shanks are available upon request.

# MST ANGLE HEADS - HALF SERIES



- COMPACT AND LIGHT WEIGHT DESIGN
- CAST IRON HOUSING FOR MAXIMUM RIGIDITY
- EXCLUSIVELY FOR TAPPING APPLICATIONS

## GEAR RATIO

M/C Spindle to Angle Head = 1 : 1 for Models 153 & 155  
1 : 0.83 for Model 157

## ROTATING DIRECTION

M/C Spindle to Angle Axis = CCW: CW

## FOR TAPPING APPLICATIONS

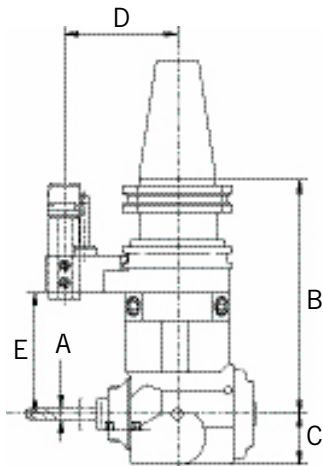


FIG. 1

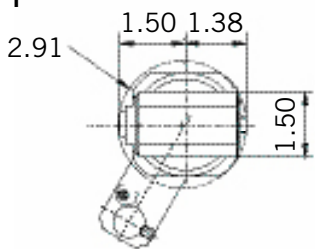


FIG. 2

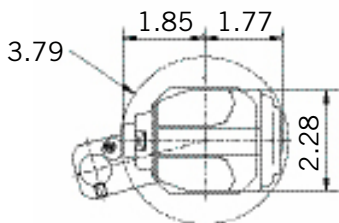
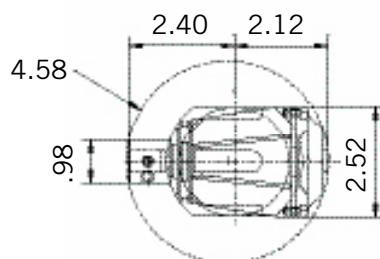


FIG. 3



SHANK	ORDER NO.	RANGE A TAP SLEEVE	B	C	D	E	MAX RPM*	WT (LB.)	FIG.
CAT40	140-153-5	#4-1/4	5.31	.75	2.56	2.76	6,000	6.8	1
	140-153-8	#153	7.68			5.12		7.5	
	140-155-5	#4-1/2	5.31	1.14		2.76	4,000	8.2	2
	140-155-8	#155	7.68			5.12		11.0	
	140-157-6	#4-5/8	5.91	1.26		3.03	6,000	10.4	3
	140-157-8	#155/#157	8.27			5.39		12.8	
CAT50	150-153-8	#4-1/4	7.68	.75	4.33	5.12	6,000	13.0	1
	150-153-10	#153	10.04			7.48		13.8	
	150-155-5	#4-1/2 #155	5.31	1.14		2.76	4,000	12.8	2
	150-155-8		7.68			5.12		15.7	
	150-155-10		10.04			7.48	18.5		
	150-157-6	#4-5/8 #155/#157	5.91	1.26		3.03	6,000	15.0	3
	150-157-8		8.27			5.39		17.6	
	150-157-11		10.63			7.76	20.0		
BT30	230-153L-5	#4-1/4 #153	4.72	.75	1.97/ 2.56	2.76	6,000	4.0	1
	230-155-5	#4-1/2 #155	4.8	1.14		2.76	4,000	6.4	2
BT40	240-153-5	#4-1/4	4.72	.75	2.56	2.76	6,000	6.6	1
	240-153-7	#153	7.09			5.12		7.3	
	240-155-5	#4-1/2	4.72	1.14		2.76	4,000	7.9	2
	240-155-7	#155	7.09			5.12		10.8	
	240-157-5	#4-5/8 #155/#157	5.31	1.26		3.03	6,000	9.9	3
	240-157-8		7.68			5.39		12.3	
HSK 63A	063-153-7	#4-1/4	7.21	.75	2.56	5.12	6,000	7.7	1
	063-153-10	#153	9.57			7.48		8.5	
	063-155-5	#4-1/2 #155	4.84	1.14		2.76	4,000	7.3	2
	063-155-7		7.21			5.12		10.4	
	063-155-10		9.57			7.48	13.2		
	063-157-8	#4-5/8 #155/#157	7.8	1.26		5.39	6,000	11.9	3
	063-157-10		10.16			7.76		14.3	

Note: BT30 Half units are furnished with straight positioning pins. The Common Positioning Block for BT30 is HB-01.

Note: Purchase Common Positioning Blocks (p32) and Tap Sleeves (p33) separately.

Note: \* means maximum machine spindle RPM. Capto & KM Shanks are available upon request.

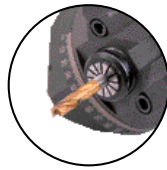


# MST ANGLE HEADS - HALF UNIVERSAL SERIES

175 TYPE Drilling & Milling

176 & 178 TYPE Drilling & Milling

177 & 179 TYPE Tapping



- **COMPACT AND LIGHT WEIGHT DESIGN**
- **CUTTING DIRECTION ANYWHERE FROM 0° TO 360° & 0° TO ±120°**
- **EXCLUSIVELY FOR DRILLING, TAPPING & LIGHT MILLING APPLICATIONS**

**GEAR RATIO:** M/C Spindle to Angle Head = 1 : 0.48 (1 : 0.56 for BT30 Models)

**ROTATING DIRECTION:** M/C Spindle to Angle Axis = CW: CW (CCW: CW for BT30 Models)

FIG. 1

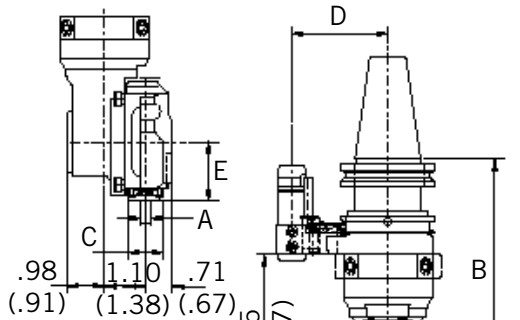


FIG. 2

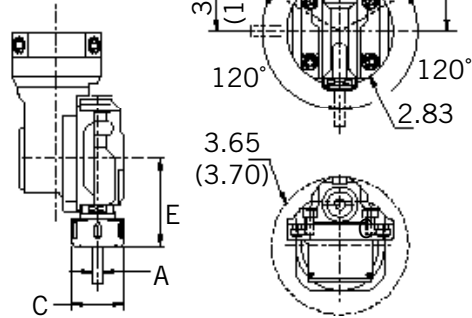


FIG. 3

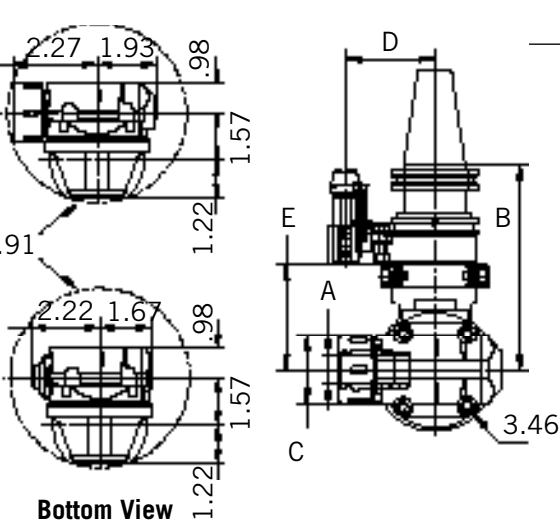


FIG. 4

SHANK	ORDER NO.	RANGE A COLLET/ TAP SLEEVE	B	C	D	E	WT (LB.)	FIG.
CAT40	140-175-6	.039-.276 #070	5.91	.93	2.56	1.54	8.8	1
	140-176-6	.125-.375 #113		1.26		2.34	9.0	2
	140-177-6	#4-1/4TAP #153		.97		1.83	8.8	1
CAT50	150-175-6	.039-.276 #070	5.91	.93	4.33	1.54	13.5	1
	150-176-6	.125-.375 #113		1.26		2.34	13.7	2
	150-177-6	#4-1/4TAP #153		.97		1.83	15.8	1
BT30	230-175-4	.039-.276 #070	4.02	1.00	1.97/ 2.56	1.18	4.0	1
	230-177-4	#4-1/4TAP #153						
BT40	240-175-5	.039-.276 #070	5.31	.93	2.56	1.54	8.4	1
	240-176-5	.125-.375 #113		1.26		2.34	8.8	2
	240-177-5	#4-1/4TAP #153		.97		1.83	8.4	1

SHANK	ORDER NO.	RANGE A COLLET	B	C	D	WT (LB.)	FIG.
CAT40	140-178-6	.250-.750 #116	5.91	1.97	2.56	11.0	3
	140-179-6	#4-1/2 TAP #155		1.42		11.0	4
CAT50	150-178-6	.250-.750 #116	5.91	1.97	4.33	15.8	3
	150-179-6	#4-1/2 TAP #155		1.42		15.8	4
BT40	240-178-5	.250-.750 #116	5.31	1.97	2.56	10.6	3
	240-179-5	#4-1/2 TAP #155		1.42		10.6	4

Note: BT30 Half Universals are furnished with straight positioning pins. The Common Positioning Block for BT30 is HB-01.

Note: Purchase Common Positioning Blocks (p32), Tap Sleeves (p33), and collets (p33) separately.

Note: The maximum RPM of machine spindle to angle axis is 6,300 : 3,000 (7,200 : 4,000 for BT30 Models)

Note: The dimensions in ( ) are for 230-175-4 and for 230-177-4. Capto & KM Shanks are available upon request.



# MST ANGLE HEADS - HALF MINI SERIES

- ULTRA SLIM AND LIGHT WEIGHT DESIGN
- CAST IRON HOUSING FOR MAXIMUM RIGIDITY
- IDEAL FOR MILLING, DRILLING, AND TAPPING APPLICATIONS

## GEAR RATIO

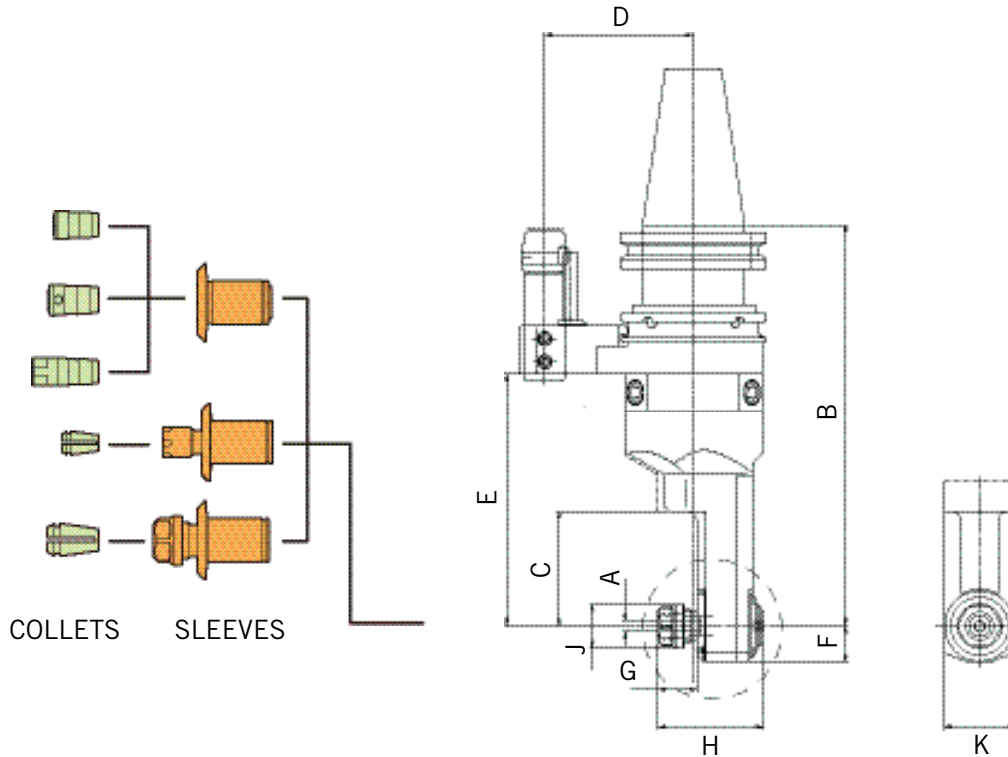
M/C Spindle to Angle Head = 1 : 0.88

## ROTATION DIRECTION

M/C Spindle to Angle Head = CCW : CW



## HALF MINI SERIES SYSTEM CHART AND DIMENSION



See next page for details of angle axis with sleeve option.

TAPER	ORDER NO.	RANGE A	B	C	D	E	F	G	H	J	K	MAX RPM*	WT (LB.)										
CAT40	140-151-7	.019 – .275	6.89	1.97	2.56	4.33						5,000	6.7										
	140-151-9		8.66	3.74	2.56	6.10							7.3										
CAT50	150-151-7		6.89	1.97	4.33	4.33							.61	.67	1.81	.75	1.22	11.3					
	150-151-9		8.66	3.74	4.33	6.10												11.7					
BT30	230-151-6		6.10	1.97	2.56	3.94												6.10					4.0
BT40	240-151-6		6.30	1.97	2.56	4.33																	6.2
	240-151-8		8.07	3.74	2.56	6.10																	6.7

Note: \*means the maximum machine spindle.

Note: Half Mini Series units are furnished with built-in HMA-102, #102 (ER11) sleeves as a standard accessory.

Other types of sleeves, collets, & common positioning blocks are optional. Purchase separately.

Note: 230-151-6 is furnished with straight positioning pin for the common positioning block, HB-01.

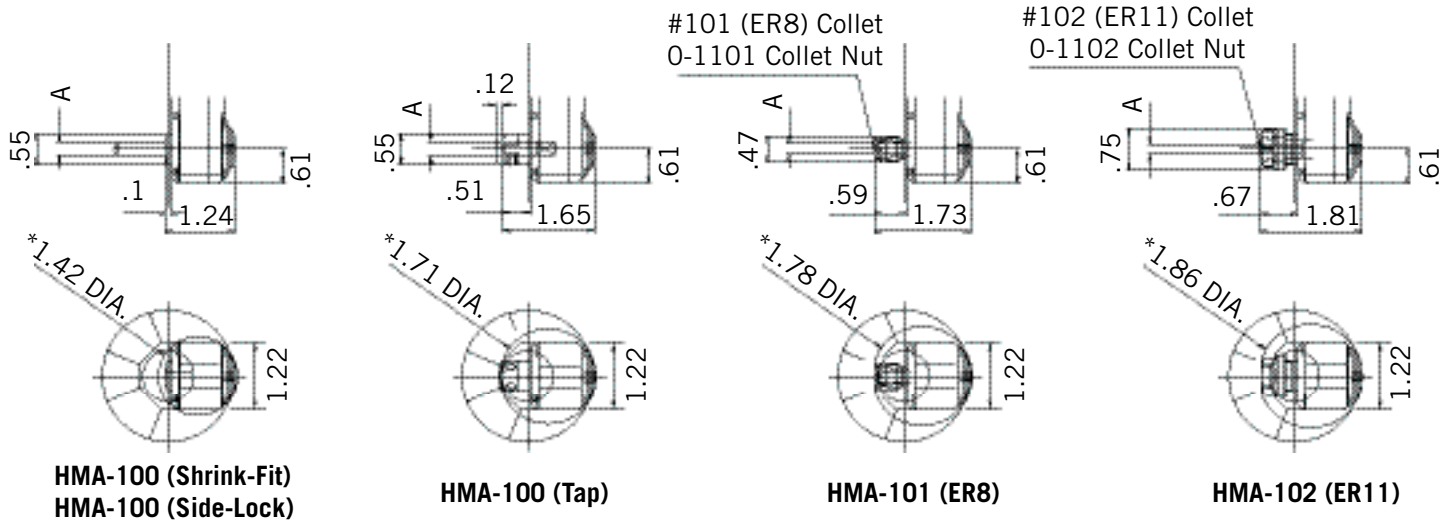
Purchase HB-01 separately.

Note: 230-151-6 is available in set-up for use on Brother Machines upon request. Consult your local distributor for details.

Note: HSK, Capto & KM shanks are available upon request.

# MST ANGLE HEADS - HALF MINI SERIES

## DETAILS OF ANGLE AXIS



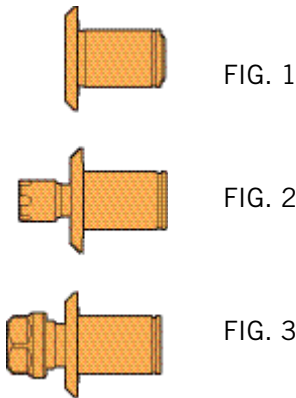
Note: See Half Mini Sleeves & Collet Charts for details of Range A.

Note: Half Mini Shrink-Fit Collets require heating device, HRB-03S-230, for cutting tool insertion. Purchase separately.

Note: Purchase Half Mini Sleeves, Half Mini Collets, and ER8 & ER11 Collets separately.

Note: \* means the smallest ID for the head can fit into.

## HALF MINI SLEEVES



ORDER NO.	APPLICABLE COLLETS	RANGE A	FIG.
HMA-100	Shrink Fit Collets	—	1
	Side-Lock Collets		
	Tap Collets		
HMA-101	#101 (ER8)	.019-.196	2
HMA-102	#102 (ER11)	.019-.275	3

Note: Purchase Shrink-Fit, Side-Lock, or Tap collets separately for HMA-100.

Note: Purchase #101 (ER8, p33) collets separately for HMA-101.

Note: Purchase #102 (ER11, p33) collets separately for HMA-102.

Note: Wrenches and nuts are furnished for HMA-101 and HMA-102.

## HALF MINI COLLETS

**SHRINK-FIT**

ORDER NO.	RANGE A
HMS-008	.1250
HMS-012	.1875
HMS-016	.2500

**SIDE-LOCK**

ORDER NO.	RAGNE A
HML-008	.1250
HML-012	.1875
HML-016	.2500

**TAP**

ORDER NO.	TAP SIZE A	SHANK DIA.
HMT-004	#4-#6	.141
HMT-008	#8	.168
HMT-010	#10	.194
HMT-012	#12	.220
HMT-013	1/4	.255

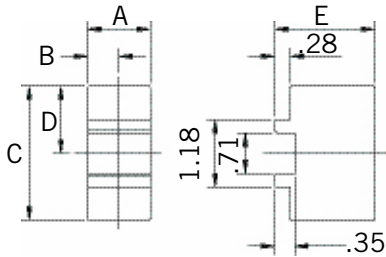
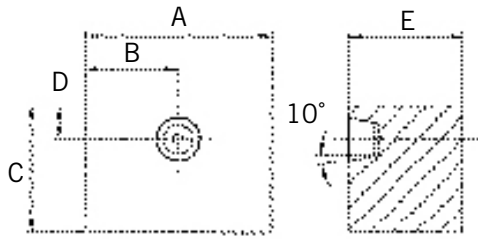
Note: Shrink-Fit collets require heating device, HRB-03S-230.

Purchase heating device separately for insertion and removal of cutting tool.

Note: Shrink-Fit collets available in metric sizes upon request.

# MST ANGLE HEADS - ACCESSORIES

## COMMON POSITIONING BLOCKS



ORDER NO.	A	B	C	D	E	FIG.
PB-40R	3.60	1.80	2.47	.65	2.23	1
PB-50R	4.76	2.38		.85		
HB-01	1.10	.55	2.36	1.18	1.77	2

Note: PB-40R for 140, 240, & 063 taper config. PB-50R for 150 and 100 taper config. HB-01 for Half with 230 shank config.  
 Note: Common Positioning Blocks must be machined by a purchaser to fit a specific machine spindle.

## TAP SLEEVES FOR HALF & HALF UNIVERSAL

SIZE	ORDER NO.	ANGLE HEAD	TAP SIZE	D
#153	1-153-004	153	#4 - #6	.141
	1-153-008		#8	.168
	1-153-010		#10	.194
	1-153-012		#12	.220
	1-153-013		1/4	.255
#155	1-155-004	155	#4 - #6	.141
	1-155-008		#8	.168
	1-155-010		#10	.194
	1-155-012		#12	.220
	1-155-013		1/4	.255
	1-155-014		5/16	.318
	1-155-015		3/8	.381
#157	1-157-017	157	1/2	.367
	1-157-022		5/8	.480

Note: ISO metric size Tap Sleeves are available upon request.

## COLLETS FOR HALF AND HALF UNIVERSAL



COLLET SIZE	ORDER NO.	COLLET CHUCK
1/8	0-113-008	#113
3/16	0-113-012*	
1/4	0-113-016	
5/16	0-113-020*	
3/8	0-113-024	
1/4	0-116-016	
5/16	0-116-020*	
3/8	0-116-024	
7/16	0-116-028*	
1/2	0-116-032	
5/8	0-116-040	
3/4	0-116-048	



CHUCK SIZE	ORDER NO.	RANGE
#070	0-070-015	.039 - .059
	0-070-020	.059 - .079
	0-070-025	.079 - .098
	0-070-030	.098 - .118
	0-070-040	.118 - .157
	0-070-050	.157 - .197
	0-070-060	.197 - .236
#120	0-070-070	.236 - .276
	0-120-040	.098 - .157
	0-120-060	.157 - .236
	0-120-080	.236 - .315
	0-120-100	.315 - .394
	0-120-120	.394 - .472
0-120-130	.433 - .512	

Note: Collet collapsibility is .008" in diameter on all sizes. \* means the size is not in stock.

Note: #113 metric size collets, ranging from 2.6mm to 10mm in 0.2mm increments, are available upon request.

Note: #116 metric collets, ranging from 6mm to 20mm in 0.2mm increments, are available upon request.

# MST ANGLE HEADS - ER & TG COLLETS

## ER COLLETS FOR MODULAR AND SOLID SERIES

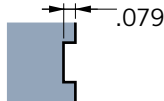
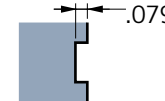
SIZE	CHUCKING RANGE A	ORDER NO.	SIZE	CHUCKING RANGE A	ORDER NO.	SIZE	CHUCKING RANGE A	ORDER NO.
#101 (ER8)	.019-.039	0-101-001	#103 (ER16)	.039-.078	0-103-001	#109 (ER32)	.039-.078	0-109-001
	.039-.059	0-101-002		.078-.118	0-103-002		.078-.118	0-109-002
	.059-.078	0-101-003		.118-.157	0-103-003		.118-.157	0-109-003
	.078-.098	0-101-004		.157-.196	0-103-004		.157-.196	0-109-004
	.098-.118	0-101-005		.196-.236	0-103-005		.196-.236	0-109-005
.118-.137	0-101-006	.236-.275	0-103-006	.236-.275	0-109-006			
.137-.157	0-101-007	.275-.314	0-103-007	.275-.314	0-109-007			
.157-.177	0-101-008	.314-.354	0-103-008	.314-.354	0-109-008			
.177-.196	0-101-009	.354-.393	0-103-009	.354-.393	0-109-009			
#102 (ER11)	.019-.039	0-102-001	#107 (ER20)	.039-.078	0-107-001		.393-.433	0-109-010
	.039-.059	0-102-002		.078-.118	0-107-002		.433-.472	0-109-011
	.059-.078	0-102-003		.118-.157	0-107-003		.472-.511	0-109-012
	.078-.098	0-102-004		.157-.196	0-107-004	.511-.551	0-109-013	
	.098-.118	0-102-005		.196-.236	0-107-005	.551-.590	0-109-014	
	.118-.137	0-102-006		.236-.275	0-107-006	.590-.629	0-109-015	
	.137-.157	0-102-007		.275-.314	0-107-007	.629-.669	0-109-016	
	.157-.177	0-102-008		.314-.354	0-107-008	.669-.708	0-109-017	
.177-.196	0-102-009	.354-.393	0-107-009	.708-.748	0-109-018			
.196-.216	0-102-010	.393-.433	0-107-010	.748-.787	0-109-019			
.216-.236	0-102-011	.433-.472	0-107-011					
.236-.255	0-102-012	.472-.511	0-107-012					
.255-.275	0-102-013							

## TG100 COLLETS FOR SOLID & FLANGE SERIES

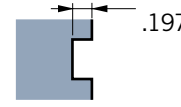
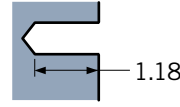
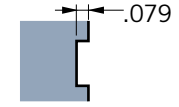
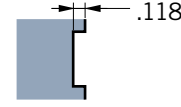
COLLET SIZE	ORDER NO.	COLLET SIZE	ORDER NO.	COLLET SIZE	ORDER NO.
3/32	0-100-006	13/32	0-100-026	23/32	0-100-046
7/64	0-100-007	27/64	0-100-027	47/64	0-100-047
1/8	0-100-008	7/16	0-100-028	3/4	0-100-048
9/64	0-100-009	29/64	0-100-029	49/64	0-100-049
5/32	0-100-010	15/32	0-100-030	25/32	0-100-050
11/64	0-100-011	31/64	0-100-031	51/64	0-100-051
3/16	0-100-012	1/2	0-100-032	13/16	0-100-052
13/64	0-100-013	33/64	0-100-033	53/64	0-100-053
7/32	0-100-014	17/32	0-100-034	27/32	0-100-054
15/64	0-100-015	35/64	0-100-035	55/64	0-100-055
1/4	0-100-016	9/16	0-100-036	7/8	0-100-056
17/64	0-100-017	37/64	0-100-037	57/64	0-100-057
9/32	0-100-018	19/32	0-100-038	29/32	0-100-058
19/64	0-100-019	39/64	0-100-039	59/64	0-100-059
5/16	0-100-020	5/8	0-100-040	15/16	0-100-060
21/64	0-100-021	41/64	0-100-041	61/64	0-100-061
11/32	0-100-022	21/32	0-100-042	31/32	0-100-062
23/64	0-100-023	43/64	0-100-043	63/64	0-100-063
3/8	0-100-024	11/16	0-100-044	1	0-100-064
25/64	0-100-025	45/64	0-100-045		

# MST ANGLE HEADS - CUTTING DATA

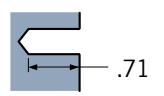
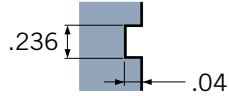
## MODULAR SERIES

WORK PIECE		
MODEL NO.	240-162-3	240-162-3
MATERIAL	SAE304 Stainless Steel	ASTM2017 Aluminum
CUTTER	10mm, 2flute EM	10mm, 2flute Carbide EM
CUTTING CONDITIONS	640 rpm F: 2.36 in/min. V: 65.6 ft/min. f: .002 in. per tooth	4,000 rpm F: 15.75 in/min V: 413.4 ft/min f: .002 inch per tooth

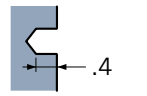
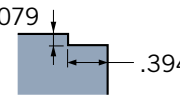
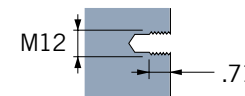
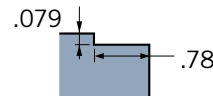
## SOLID SERIES

WORK PIECE				
MODEL NO.	150-160-8	240-161-6	240-161-6	150-160-8
MATERIAL	ASTM2017 Aluminum	AISI1055 Steel	SAE304 Stainless Steel	SAE304 Stainless Steel
CUTTER	16mm, 2flute EM	12mm, 2flute EM	12mm, 2flute EM	16mm, 2flute EM
CUTTING CONDITIONS	1,800 rpm F: 5.12 in/min. V: 295.3 ft/min. f: .0016 in. per tooth	527 rpm F: 1.54 in/min V: 65.6 ft/min f: .0028 inch per tooth	527 rpm F: 0.79 in/min. V: 196.9 ft/min. f: .0024 inch per tooth	570 rpm F: 1.57 in/min. V: 95.1 ft/min. f: .0016 inch per tooth

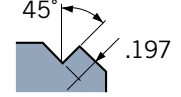
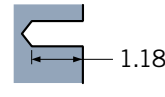
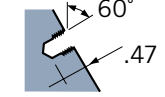
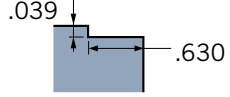
## HALF MINI SERIES

WORK PIECE		
MODEL NO.	230-151-6	240-151-8
MATERIAL	AISI1050 Steel	AISI1050 Steel
CUTTER	6mm, Carbide Drill	6mm, Carbide Drill
CUTTING CONDITIONS	5,000 rpm F: 9.8 in/min. V: 3.70 ft/min. f: .002 in. per tooth	3,500 rpm F: 8.27 in/min. V: 2.60 ft/min f: .0012 inch per tooth

## HALF SERIES

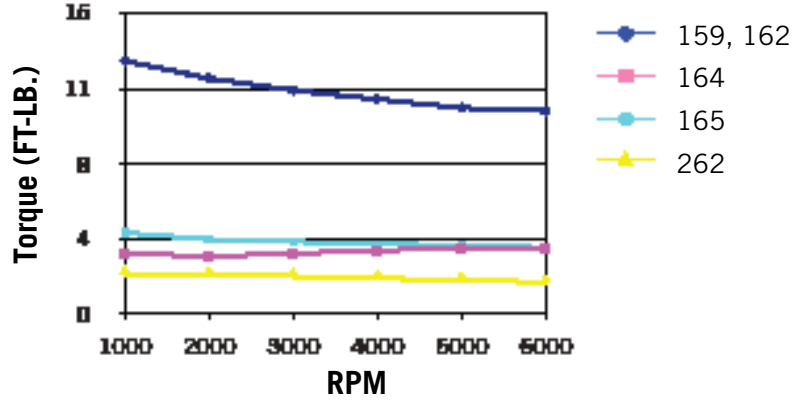
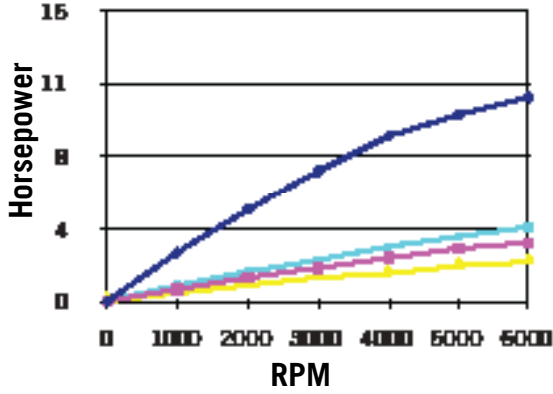
WORK PIECE				
MODEL NO.	240-154-5	240-154-5	240-155-5	240-156-5
MATERIAL	AISI1055 Steel	AISI1055 Steel	AISI1055 Steel	AISI1055 Steel
CUTTER	12mm Drill	10mm EM	12M Tap	20mm EM
	670 rpm F: 3.15 in/min. V: 83.7 ft/min.	350 rpm F: 1.97 in/min V: 36.1 ft/min	184 rpm F: 12.68 in/min. V: 23 ft/min.	158 rpm F: 1.26 in/min. V: 32.8 ft/min.

## HALF UNIV SERIES

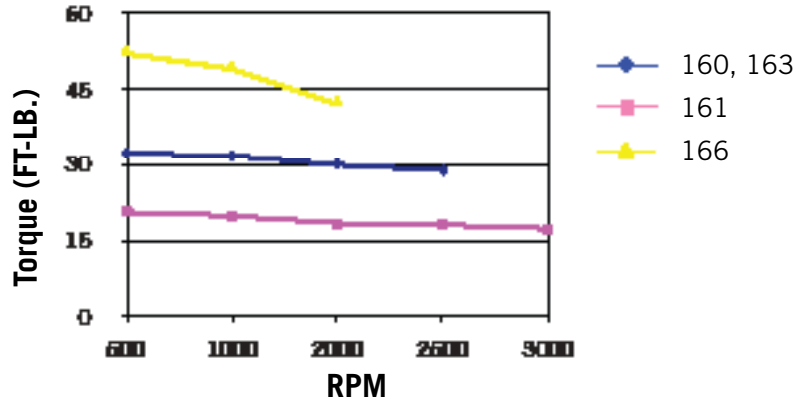
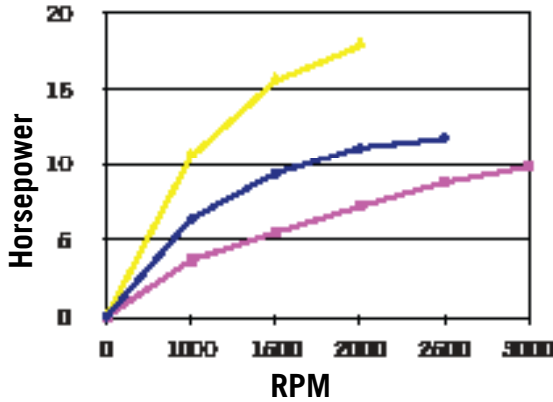
WORK PIECE				
MODEL NO.	150-175-6	150-175-6	240-177-5	240-178-5
MATERIAL	AISI1055 Steel	SAE304 Stainless Steel	AISI1055 Steel	AISI1055 Steel
CUTTER	10mm EM	10mm Drill	M8 Tap	16mm EM
	900 rpm F: 3.94 in/min. V: 91.9 ft/min.	314 rpm F: .63 in/min V: 32.5 ft/min	250 rpm F: 12.28 in/min. V: 20.7 ft/min.	140 rpm F: 1.57 in/min. V: 23 ft/min.

# MST ANGLE HEADS - HORSEPOWER & TORQUE CHARTS

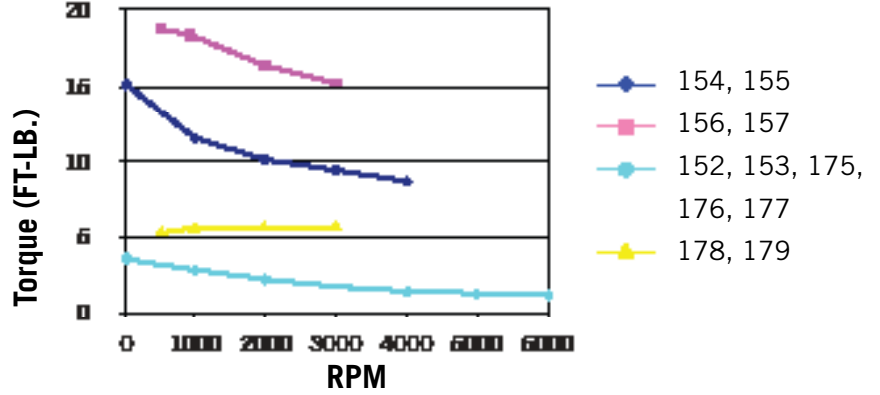
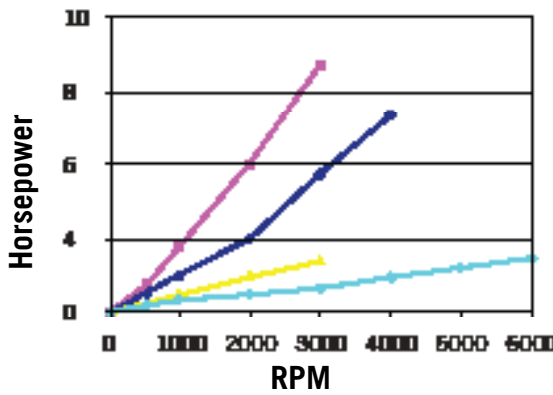
## MODULAR SERIES



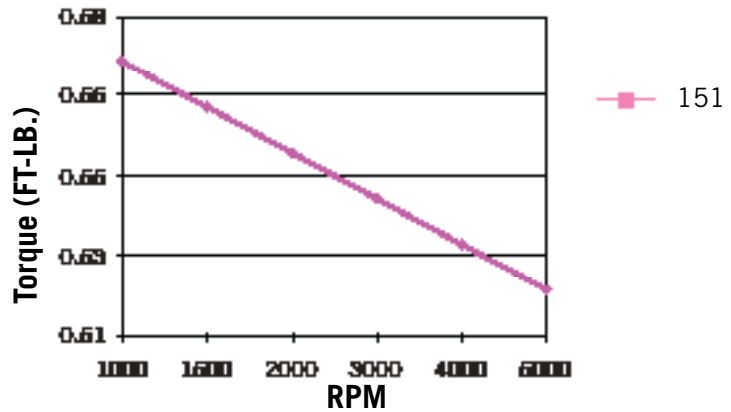
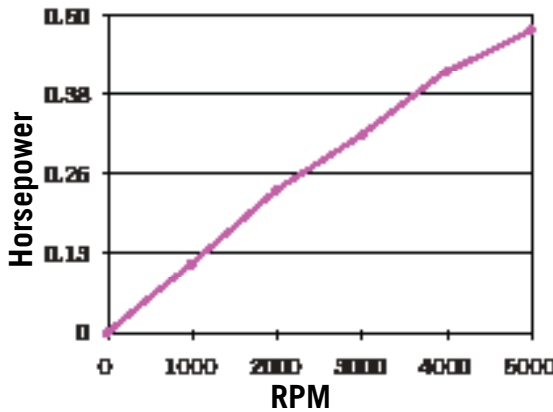
## SOLID & FLANGE SERIES



## HALF & HALF UNIVERSAL SERIES



## HALF MINI SERIES





# MST BRAND CUSTOM ANGLE HEADS



We are proud to offer MST brand Angle Heads to serve almost any standard, specialized or custom application. Please contact us with your requirements.

Most Angle Heads are serviced and repaired at the Kitagawa NorthTech Service facility located in Schaumburg, Illinois.

**Kitagawa NorthTech, Inc.  
USA Headquarters**

*Headquarters, manufacturing and service for the Americas, Kitagawa NorthTech, Inc. is located in Schaumburg, IL.*

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