



Mirror Ball

High Precision Indexable Ball Nose End Mill

High Precision:

Insert radius form accuracy is below $\pm .0004$ " when fixed to the holder (accuracy below $\pm .00024$ " on insert alone), increasing the possibility of equal or higher precision machining when comparing solid ball nose end mill machining.

Cost Performance:

Finishing with Mirror Ball can replace the conventional solid carbide ball nose end mill. By adopting economical indexable insert, tool costs of finishing process can be reduced greatly.

• Styles of Inserts

- The Mirror Ball (neutral geometry) leaves a mirror finish.
- The Mirror-S (helical geometry) great for high temp alloys and stainless steels.
- The Mirror-TG (negative helix) finishes materials up to 60 HRC with a strong edge.
- The new Mirror-SSR has full radius geometry for machining more than 180 degrees.

• Precision clamp screw mounting

The ground screw precisely locates insert in body, giving high accuracy and repeatability from insert to insert.

• DH coating

The new DH coating designed to perform in high hard materials due to its ultra-micro grain substrate of carbide, allowing higher surface footage due to its higher resistance of oxidation and wear.

• GRM insert

- New bull nose insert with large radius.
- Bigger step over when finishing wide concave applications.
- Leaves smoother surface finish than a standard ball nose cutting on the tip.

• Carbide shank

Using the carbide shank or carbide holder with modular head achieves maximum tool life and highest precision machining for finishing operation in high speed cutting.





Copy Milling



Pocket Milling



Slotting

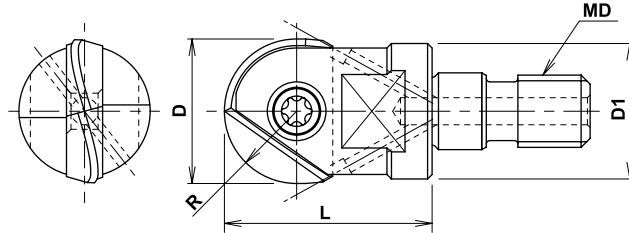
Mirror Ball

INCH

METRIC

MODULAR HEAD

MBX Type - Coolant Thru



Specifications

CATALOG NUMBER	STK	DIMENSIONS					HEAD TORQUE		INSERT		PARTS	
		D	R	L	D1	MD	lbs/ft	Nm	Inch	Metric	Screw	Wrench
MBX-100-M6	•	10mm	5mm	18mm	9.7mm	M6	5.90	8	-	BNM-100 BNM-110	FSW-3007H	T-08
MBX-120-M6	•	.500"/12mm	.250"	.787"	.452"	M6	5.90	8	BME-0500	BNM-120	FSW-3509H	T-10
MBX-160-M8	•	.625"/16mm	.312"	.903"	.591"	M8	11.8	16	BME-0625	BNM-160	FSW-4013H	T-15
MBX-200-M10	•	.750"/20mm	.375"	1.16"	.728"	M10	11.8	16	BME-0750	BNM-200	FSW-5016H	A-20W
MBX-250-M12	•	1.0"/25mm	.500"	1.38"	.945"	M12	14.7	20	BME-1000	BNM-250	FSW-6020	T-30
MBX-300-M16	•	1.25"/30mm or 32mm	.625"	1.69"	1.14"	M16	18.4	25	BME-1250	BNM-300 BNM-320	FSW-8025	A-40

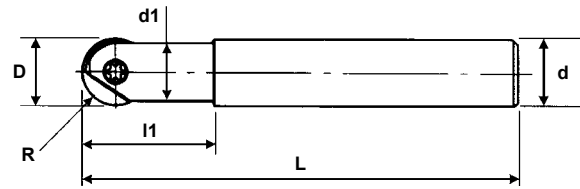
See page A-77 for Modular Head Shanks

Note: All cutters are supplied without inserts or wrenches.

**INCH**

Mirror Ball

STEEL SHANK

BNM Type - Straight Style

Specifications

CATALOG NUMBER	STK	DIMENSIONS							INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	d	α		Screw	Wrench
BNMS-120026S-S050	•	.500	.250	3.26	.393	1.02	.500	-	BME-0500 (BNM-120)	FSW-3509H	T-10
BNMM-120032S-S050	•	.500	.250	5.13	.393	1.26	.500	-			
BNMM-120053S-S050	•	.500	.250	4.33	.393	2.08	.500	-			
BNML-120046S-S050	•	.500	.250	5.88	.393	1.81	.500	-			
BNMS-160032S-S062	•	.625	.312	3.62	.551	1.26	.625	-	BME-0625 (BNM-160)	FSW-4013H	T-15
BNMM-160063S-S062	•	.625	.312	4.84	.551	2.48	.625	-			
BNMS-200038S-S075	•	.750	.375	4.09	.669	1.49	.750	-	BME-0750 (BNM-200)	FSW-5016H	A-20
BNMM-200044S-S075	•	.750	.375	6.28	.669	1.73	.750	-			
BNMM-200075S-S075	•	.750	.375	5.55	.669	2.95	.750	-			
BNML-200060S-S075	•	.750	.375	6.88	.669	2.36	.750	-			
BNMS-250045S-S100	•	1.00	.500	4.76	.826	1.77	1.00	-	BME-1000 (BNM-250)	FSW-6020	T-30
BNMM-250070S-S100	•	1.00	.500	7.50	.826	2.76	1.00	-			
BNMM-250090S-S100	•	1.00	.500	6.53	.826	3.54	1.00	-			
BNML-250080S-S100	•	1.00	.500	9.06	.826	3.15	1.00	-			
BNMS-300053S-S125	•	1.25	.625	5.23	1.02	2.08	1.25	-	BME-1250 (BNM-300 or BNM-320)	FSW-8025	A-40
BNMM-300106S-S125	•	1.25	.625	7.32	1.02	4.17	1.25	-			

Note: All cutters are supplied without inserts or wrenches.

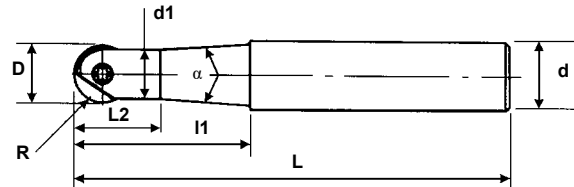


Mirror Ball

INCH

STEEL SHANK

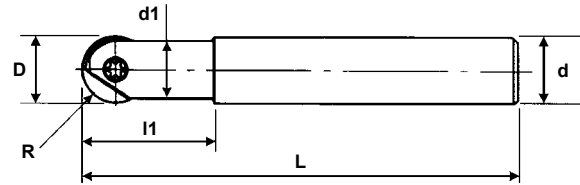
BNM Type - Taper Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	L2	d	α		Screw	Wrench
BNMS-060035T-S037	•	.250	.125	3.62	.212	1.37	.590	.375	12°	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMS-080035T-S050	•	.312	.156	3.62	.283	1.37	.728	.500	21°17'	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080053T-S050	•	.312	.156	4.33	.283	2.08	.728	.500	8°			
BNML-080075T-S050	•	.312	.156	5.19	.283	2.95	.728	.500	3°40'			
BNMS-100035T-S050	•	.375	.187	3.62	.355	1.37	.827	.500	19°3'	BME-0375 (BNM-100) (BNM-110)	FSW-3007H	T-08
BNMM-100053T-S050	•	.375	.187	4.33	.355	2.08	.827	.500	7°			
BNML-100075T-S050	•	.375	.187	5.19	.355	2.95	.827	.500	3°40'			
BNMM-120053T-S050	•	.500	.250	4.33	.393	2.08	.866	.500	3°	BME-0500 (BNM-120)	FSW-3509H	T-10
BNML-120085T-S062	•	.500	.250	5.70	.393	3.34	.866	.625	3°			
BNMM-160063T-S062	•	.625	.312	4.84	.551	2.48	1.10	.625	2°48'	BME-0625 (BNM-160)	FSW-4013H	T-15
BNML-160100T-S075	•	.625	.312	6.53	.551	3.93	1.10	.750	3°			
BNMM-200075T-S075	•	.750	.375	5.55	.669	2.95	1.34	.750	2°	BME-0750 (BNM-200)	FSW-5016H	A-20
BNML-200115T-S100	•	.750	.375	7.51	.669	4.52	1.34	1.00	4°			
BNMM-250090T-S100	•	1.00	.500	6.53	.826	3.54	1.61	1.00	4°40'	BME-1000 (BNM-250)	FSW-6020	T-30
BNML-250135T-S125	•	1.00	.500	8.46	.826	5.31	1.61	1.25	3°			
BNMM-300106T-S125	•	1.25	.625	7.32	1.02	4.17	1.93	1.25	5°30'	BME-1250 (BNM-300) (BNM-320)	FSW-8025	A-40
BNML-300160T-S125	•	1.25	.625	9.44	1.02	6.29	1.93	1.25	2°20'			

Note: All cutters are supplied without inserts or wrenches.

**METRIC****Mirror Ball****STEEL SHANK****BNM Type - Straight Style****Specifications**

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	a		Screw	Wrench
BNMS-120026S-S12	•	12	6	83	10	26	-	12	-	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-120053S-S12	•	12	6	110	10	53	-	12	-			
BNMS-160032S-S16	•	16	8	92	14	32	-	16	-	BNM-160 (BME-0625)	FSW-4013H	T-15
BNMM-160063S-S16	•	16	8	123	14	63	-	16	-			
BNMS-200038S-S20	•	20	10	104	17	38	-	20	-	BNM-200 (BME-0750)	FSW-5016H	A-20
BNMM-200075S-S20	•	20	10	141	17	75	-	20	-			
BNMS-250045S-S25	•	25	12.5	121	21	45	-	25	-	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250090S-S25	•	25	12.5	166	21	90	-	25	-			
BNMS-300053S-S32	•	30	15	133	26	53	-	32	-	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-300106S-S32	•	30	15	186	26	106	-	32	-			

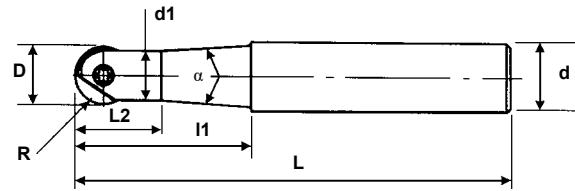
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Mirror Ball

METRIC

STEEL SHANK

BNM Type - Taper Style


Specifications

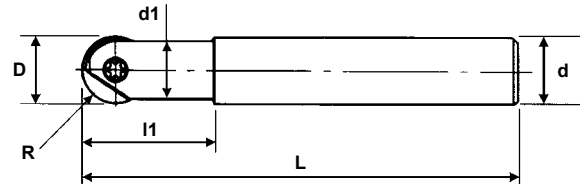
CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	L1	L2	d	α		Screw	Wrench
BNMS-060030T-S10	•	6	3	80	5.4	30	15	10	8°15'	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNMS-080035T-S12	•	8	4	92	7.2	35	19	12	7°45'	BNM-080 (BME-0312)	FSW-2506H	T-07
BNMM-080053T-S12	•	8	4	110	7.2	53	19	12	3°30'			
BNML-080075T-S12	•	8	4	132	7.2	75	19	12	1°30'			
BNMS-100035T-S12	•	10	5	92	9	35	21	12	5°45'	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNMM-100053T-S12	•	10	5	110	9	53	21	12	2°30'			
BNML-100075T-S12	•	10	5	132	9	75	21	12	1°			
BNMM-120053T-S12	•	12	6	110	10	53	22	12	1°30'	BNM-120 (BME-0500)	FSW-3509H	T-10
BNML-120085T-S16	•	12	6	145	10	85	22	16	1°30'			
BNMM-160063T-S16	•	16	8	123	14	63	28	16	1°30'	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-160100T-S20	•	16	8	166	14	100	28	20	1°30'			
BNM-200050T-S25LS	•	20	10	170	17	50	34	25	12°	BNM-200 (BME-0750)	FSW-5016H	A-20
BNMM-200075T-S20	•	20	10	141	17	75	34	20	2°			
BNML-200115T-S25	•	20	10	191	17	115	34	25	1°50'			
BNM-250060T-S32LS	•	25	12.5	200	21	60	41	32	14°	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250090T-S25	•	25	12.5	166	21	90	41	25	2°20'			
BNML-250135T-S32	•	25	12.5	215	21	135	41	32	1°30'			
BNM-300080T-S32LS	•	30	15	220	26	80	49	32	4°	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-300106T-S32	•	30	15	186	26	106	49	32	3°			
BNML-300160T-S32	•	30	15	240	26	160	49	32	1°10'			

Note: All cutters are supplied without inserts or wrenches.

**INCH**

Mirror Ball

CARBIDE SHANK

BNM-C Type - Straight Style

Specifications

CATALOG NUMBER	STK	DIMENSIONS							INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	d	α		Screw	Wrench
BNMS-060016S-S025C	•	.250	.125	3.00	.212	.625	.250	-	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMS-060038S-S025C	•	.250	.125	3.75	.212	1.50	.250	-			
BNMM-060050S-S025C	•	.250	.125	4.25	.212	2.00	.250	-			
BNML-060076S-S025C	•	.250	.125	5.25	.212	3.00	.250	-			
BNMS-080038S-S031C	•	.312	.156	3.75	.283	1.50	.312	-	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080057S-S031C	•	.312	.156	4.50	.283	2.25	.312	-			
BNML-080089S-S031C	•	.312	.156	5.75	.283	3.50	.312	-			
BNMS-100038S-S037C	•	.375	.187	3.75	.354	1.50	.375	-	BME-0375 (BNM-100) (BNM-110)	FSW-3007H	T-08
BNMM-100057S-S037C	•	.375	.187	4.50	.354	2.25	.375	-			
BNML-100089S-S037C	•	.375	.187	5.75	.354	3.50	.375	-			
BNMS-120029S-S050C	•	.500	.250	3.38	.393	1.14	.500	-	BME-0500 (BNM-120)	FSW-3509H	T-10
BNMM-120063S-S050C	•	.500	.250	4.75	.393	2.50	.500	-			
BNML-120101S-S050C	•	.500	.250	6.35	.393	4.00	.500	-			
BNMS-160034S-S062C	•	.625	.312	3.70	.551	1.33	.625	-	BME-0625 (BNM-160)	FSW-4013H	T-15
BNMM-160063S-S062C	•	.625	.312	4.84	.551	2.48	.625	-			
BNML-160114S-S062C	•	.625	.312	7.10	.551	4.50	.625	-			
BNMS-200038S-S075C	•	.750	.375	4.09	.669	1.49	.750	-	BME-0750 (BNM-200)	FSW-5016H	A-20
BNMM-200075S-S075C	•	.750	.375	5.55	.669	2.95	.750	-			
BNML-200127S-S075C	•	.750	.375	8.00	.669	5.00	.750	-			
BNMM-250090S-100C	•	1.00	.500	6.53	.826	3.54	1.00	-	BME-1000 (BNM-250)	FSW-6020	T-30
BNMM-250114S-S100C	•	1.00	.500	7.50	.826	4.50	1.00	-			
BNML-250152S-S100C	•	1.00	.500	10.00	.826	6.00	1.00	-			

Note: All cutters are supplied without inserts or wrenches.

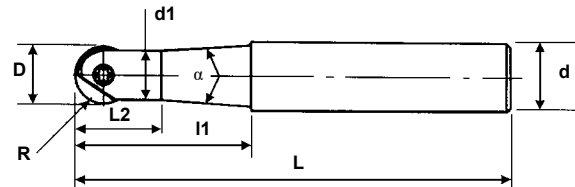


Mirror Ball

INCH

CARBIDE SHANK

BNM-C Type - Taper Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	L2	d	α		Screw	Wrench
BNMS-060032T-S037C	•	.250	.125	3.50	.212	1.26	.492	.375	10°	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMM-060050T-S037C	•	.250	.125	4.21	.212	1.96	.492	.375	5°			
BNML-060072T-S037C	•	.250	.125	5.07	.212	2.83	.88	.375	3°			
BNMS-080035T-S050C	•	.312	.156	3.62	.283	1.37	.787	.500	10°	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080053T-S050C	•	.312	.156	4.33	.283	2.08	.787	.500	8°			
BNML-080075T-S050C	•	.312	.156	5.19	.283	2.95	.787	.500	5°			
BNMS-100035T-S050C	•	.375	.187	3.62	.355	1.37	.886	.500	10°	BME-0375 (BNM-100) (BNM-110)	FSW-3007H	T-08
BNMM-100053T-S050C	•	.375	.187	4.33	.355	2.08	.886	.500	6°			
BNML-100075T-S050C	•	.375	.187	5.19	.355	2.95	.886	.500	3°			
BNMM-120053T-S050C	•	.500	.250	4.33	.393	2.08	1.02	.500	3°	BME-0500 (BNM-120)	FSW-3509H	T-10
BNML-120085T-S062C	•	.500	.250	5.70	.393	3.34	1.02	.625	4°			
BNML-160100T-S075C	•	.625	.312	6.53	.551	3.93	1.22	.750	2°	BME-0625 (BNM-160)	FSW-4013H	T-15
BNML-200115T-S100C	•	.750	.375	7.52	.669	4.52	1.41	1.00	5°	BME-0750 (BNM-200)	FSW-5016H	A-20

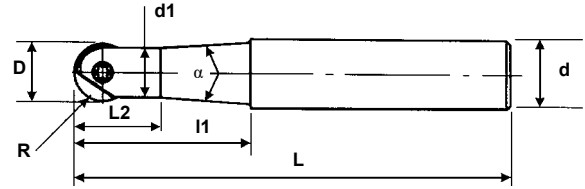
Note: All cutters are supplied without inserts or wrenches.

**METRIC**

Mirror Ball

CARBIDE SHANK

BNM-C Type - Taper Style



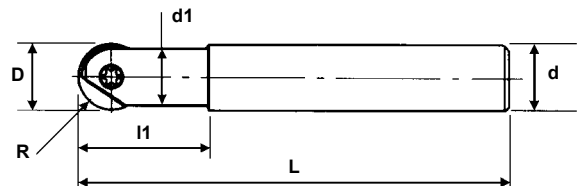
Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	L1	L2	d	α		Screw	Wrench
BNMS-060030T-S10C	•	6	3	80	5.4	30	15	10	6°	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNML-080075T-S12C	•	8	4	132	7.2	75	20	12	2°	BNM-080 (BME-0312)	FSW-2506H	T-07
BNML-100075T-S12C	•	10	5	132	9	75	23	12	1°30'	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNML-120085T-S16C	•	12	6	145	10	85	27	16	2°30'	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-160063T-S20C	•	16	8	123	14	63	30.5	20	4°	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-160100T-S20C	•	16	8	166	14	100	30.5	20	1°15'	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-200115T-S25C	•	20	10	191	17	115	36	25	2°	BNM-200 (BME-0750)	FSW-5016H	A-20
BNML-300160T-S32C	•	30	15	240	26	160	48	32	1°	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40

Note: All cutters are supplied without inserts or wrenches.

CARBIDE SHANK

BNM-C Type - Straight Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	L1	L2	d	α		Screw	Wrench
BNMS-060017S-S06C	•	6	3	60	5.4	17	-	6	-	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNMM-060035S-S06C	•	6	3	92	5.4	35	-	6	-			
BNML-060017S-S06C	•	6	3	120	5.4	17	-	6	-			
BNMS-080025S-S08C	•	8	4	90	7.2	25	-	8	-	BNM-080 (BME-0312)	FSW-2506H	T-07
BNMM-080035S-S08C	•	8	4	92	7.2	35	-	8	-			
BNML-080075S-S08C	•	8	4	140	7.2	75	-	8	-			
BNML-080095S-S08C	•	8	4	160	7.2	95	-	8	-	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNMS-100030S-S10C	•	10	5	100	9	30	-	10	-			
BNMM-100043S-S10C	•	10	5	100	9	43	-	10	-			
BNML-100075S-S10C	•	10	5	140	9	75	-	10	-			
BNML-100080S-S10C	•	10	5	220	9	80	-	10	-			
BNML-100095S-S10C	•	10	5	160	9	95	-	10	-			
BNML-100140S-S10C	•	10	5	220	9	140	-	10	-			

Note: All cutters are supplied without inserts or wrenches.

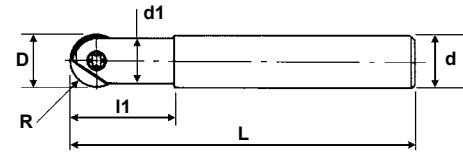
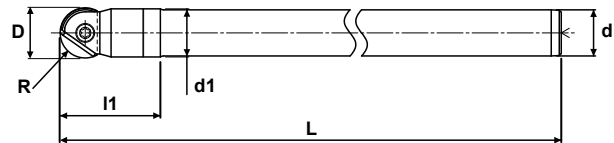


Mirror Ball

METRIC

CARBIDE SHANK

BNM-C Type - Straight Style


Fig. 1

Fig. 2


Specifications

CATALOG NUMBER	STK	DIMENSIONS						FIG.	INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	d			Screw	Wrench
BNMS-120028S-S12C	•	12	6	83	11	28	12	1	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-120053S-S12C	•	12	6	110	11	53	12	1			
BNML-120095S-S12C	•	12	6	160	11	95	12	1			
BNML-120100S-S12C	•	12	6	220	11	100	12	1			
BNML-120130S-S12C	•	12	6	200	11	130	12	1			
BNML-120150S-S12C	•	12	6	220	11	150	12	1			
BNMS-160033S-S16C	•	16	8	92	15	33	16	1	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-160070S-S16C	•	16	8	140	15	70	16	1			
BNML-160090S-S16C	•	16	8	160	15	90	16	1			
BNML-160100S-S16C	•	16	8	220	15	100	16	1			
BNML-160110S-S16C	•	16	8	180	15	110	16	1			
BNML-160150S-S16C	•	16	8	220	15	150	16	1			
BNMU-160220-S15C	•	16	8	220	15	-	15	2			
BNMS-200039S-S20C	•	20	10	104	19	39	20	1	BNM-200 (BME-0750)	FSW-5016H	A-20
BNMM-200075S-S20C	•	20	10	141	19	75	20	1			
BNML-200100S-S20C	•	20	10	220	19	100	20	1			
BNML-200105S-S20C	•	20	10	180	19	105	20	1			
BNML-200125S-S20C	•	20	10	200	19	125	20	1			
BNML-200170S-S20C	•	20	10	250	19	170	20	1			
BNML-200220S-S20C	•	20	10	300	19	220	20	1			
BNMU-200270-S18C	•	20	10	270	19	40	18	2			
BNMM-250090S-S25C	•	25	12.5	166	24	90	25	1	BNM-250 (BME-1000)	FSW-6020	T-30
BNML-250100S-S25C	•	25	12.5	220	24	100	25	1			
BNML-250140S-S25C	•	25	12.5	220	24	140	25	1			
BNML-250170S-S25C	•	25	12.5	250	24	170	25	1			
BNMM-300120S-S32C	•	30	15	200	29	120	32	1	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNML-300100S-S32C	•	30	15	220	29	100	32	1			
BNML-300140S-S32C	•	30	15	220	29	140	32	1			
BNML-300170S-S32C	•	30	15	250	29	170	32	1			
BNML-300220S-S32C	•	30	15	300	29	220	32	1			

Note: All cutters are supplied without inserts or wrenches.