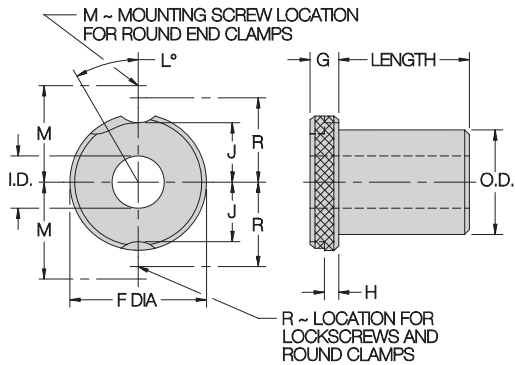


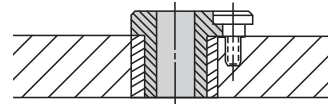


SLIP/FIXED RENEWABLE SF



APPLICATIONS:

Replaceable bushing generally used with a liner bushing and lock screw. Use when you expect to replace bushings during the tooling's lifetime, or when you want to switch bushings to perform multi-step operations with the same tooling. SF bushings combine the benefits of older S-type slip-renewable and F-type fixed-renewable bushings: One side has a small recess for fixed mounting; the other has a locking recess that allows the bushing to slip down, then lock in place by rotating it. S and F types are now obsolete and combination SF bushings will be furnished at no extra charge.



INCH

BODY OD	F DIA	G	H	J	L	M	R	LOCK SCREW	
3/16	5/16	3/16	3/32	3/32	55°		17/64	LS-0	
1/4	7/16			9/64	30°		23/64	TW-2	
5/16	35/64	1/4	1/8	11/64	65°	5/8	1/2	LS-1	
3/8	5/8			15/64	30°		29/64	TW-2	
7/16	5/8			15/64	30°		29/64	TW-2	
1/2	51/64			19/64	65°	3/4	5/8	LS-1	
9/16	7/8			23/64	65°		37/64	TW-2	
5/8	7/8			23/64	30°		37/64	TW-2	
3/4	1-3/64			27/64	50°	7/8	3/4	LS-1	
7/8	1-1/4			31/64	30°		53/64	TW-7	
1	1-27/64			19/32	35°	1-7/64	59/64		
1-1/4	1-5/8			43/64	30°		1-1/64		LS-2
1-3/8	1-51/64	25/32	30°	1-19/64	1-7/64				
1-1/2	1-7/8	51/64	30°		1-9/64				
1-3/4	2-19/64	3/8	3/16	1	30°	1-41/64	1-25/64	LS-3	
2-1/4	2-51/64			1-1/4	25°	1-57/64	1-41/64		

METRIC

BODY OD	F DIA	G	H	J	L	M	R	LOCK SCREW		
8mm	15mm	6mm	3mm	4.5mm	65°		11.5mm	LSM-1		
10mm	18mm			6mm	65°		13mm	LSM-2		
12mm	22mm			7.5mm	60°		16mm			
15mm	26mm	8mm	4mm	9.5mm	50°		18mm	LSM-3		
18mm	30mm			11.5mm	50°		20mm	LSM-4		
22mm	34mm			13mm	35°		23.5mm			
26mm	39mm			15.5mm	35°		26mm			
30mm	46mm			10mm	5.5mm	19mm	30°		29.5mm	LSM-5
35mm	52mm					22mm	30°		32.5mm	LSM-6
42mm	59mm					25.5mm	30°		36mm	
48mm	66mm					28.5mm	30°		41mm	
55mm	74mm					32.5mm	25°		45mm	
62mm	82mm					36.5mm	25°		49mm	
70mm	90mm	12mm	7mm			40.5mm	25°		53mm	LSM-7
78mm	100mm					45.5mm	25°		58mm	LSM-8
85mm	110mm					50.5mm	20°		63mm	
95mm	120mm					55.5mm	20°		68mm	
105mm	130mm			60.5mm	20°		73mm			

ORDERING EXAMPLES:

- SF-20-16-.1250 Standard inch bushing, inch ID
- SF-20-16-.1772 Standard inch bushing, mm ID (.1772 = 4.50mm)
- SF-20-16-.1250 REAMER Reamer tolerance on ID
- SF-20-16-.1250 NCB No counterbore on long bushings marked with * (no counterbore is standard on all other bushings)
- SFC-20-16-.1250 Carbide bushing
- SFM-8-16-4.50 Standard metric bushing

Standard prices apply only to bushings with a standard-drill-size ID within the stated ID range. See catalog back cover for standard drill sizes and their decimal equivalents. For prices on non-standard ID sizes, including reamer-tolerance and tap-guide bushings, please contact factory.

STANDARD ID TOLERANCES:

From #80 to 1/4"	+0.001/+0.0004	From .35 to 3mm	+0.002/+0.008mm
		Over 3 to 6mm	+0.004/+0.012mm
Over 1/4 to 3/4"	+0.001/+0.0005	Over 6 to 10mm	+0.005/+0.014mm
		Over 10 to 18mm	+0.006/+0.017mm
Over 3/4 to 1-1/2"	+0.002/+0.0006	Over 18 to 30mm	+0.007/+0.020mm
		Over 30 to 50mm	+0.009/+0.025mm
Over 1-1/2 to 2-3/4"	+0.003/+0.0007	Over 50 to 80mm	+0.010/+0.029mm
		Over 80 to 120mm	+0.012/+0.034mm
			(G6 tolerance)

REAMER ID TOLERANCES:

From #60 to 1/4"	+0.0005/+0.0008	From 1 to 3mm	+0.006/+0.012mm
		Over 3 to 6mm	+0.010/+0.018mm
Over 1/4 to 1"	+0.0006/+0.0010	Over 6 to 10mm	+0.013/+0.022mm
		Over 10 to 18mm	+0.016/+0.027mm
Over 1 to 1-1/2"	+0.0008/+0.0012	Over 18 to 30mm	+0.020/+0.033mm
			(F6 tolerance)

SF SLIP/FIXED RENEWABLE



ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
.0135-.0291 #80-#70 .35-.70mm	3/16 .1875-.1873	*1/4	SF-12-4	LS-0
		*5/16	SF-12-5	
		*3/8	SF-12-6	
		*1/2	SF-12-8	
		*5/8	SF-12-10	
*3/4		SF-12-12		
.0292-.0519 #69-3/64 .75-1.25mm		1/4	SF-12-4	
		*5/16	SF-12-5	
		*3/8	SF-12-6	
		*1/2	SF-12-8	
		*5/8	SF-12-10	
.0520-.0634 #55-1/16 1.30-1.60mm		*3/4	SF-12-12	
		1/4	SF-12-4	
		*5/16	SF-12-5	
		*3/8	SF-12-6	
	*1/2	SF-12-8		
.0635-.0980 #52-#40 1.65-2.50mm	*5/8	SF-12-10		
	*3/4	SF-12-12		
	1/4	SF-12-4		
	*5/16	SF-12-5		
	*3/8	SF-12-6		
.0995-.1405 #39-#28 2.55-3.50mm	*1/2	SF-12-8		
	*5/8	SF-12-10		
	*3/4	SF-12-12		
	1/4	SF-16-4		
	5/16	SF-16-5		
	1/4 .2500-.2498	*3/8	SF-16-6	TW-2
		*1/2	SF-16-8	
		*5/8	SF-16-10	
		*3/4	SF-16-12	

ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
.0135-.0291 #80-#70 .35-.70mm	5/16 .3125-.3123	*1/4	SF-20-4	LS-1 RC-01 RK-01 RK-10
		*5/16	SF-20-5	
		*3/8	SF-20-6	
		*1/2	SF-20-8	
		*3/4	SF-20-12	
.0292-.0519 #69-3/64 .75-1.30mm		*5/16	SF-20-5	
		*3/8	SF-20-6	
		*1/2	SF-20-8	
		*3/4	SF-20-12	
		.0520-.0634 #55-1/16 1.35-1.60mm	*5/16	
*3/8			SF-20-6	
*1/2			SF-20-8	
*3/4			SF-20-12	
.0635-.0934 #52-#43 1.65-2.35mm			5/16	
		*3/8	SF-20-6	
	*1/2	SF-20-8		
	*3/4	SF-20-12		
	*1	SF-20-16		
.0935-.1249 #42-#31 2.40-3.15mm	5/16	SF-20-5		
	3/8	SF-20-6		
	*1/2	SF-20-8		
	*3/4	SF-20-12		
	*1	SF-20-16		
.1250-.1935 1/8-#10 3.20-4.90mm	*1-3/8	SF-20-22		
	5/16	SF-20-5		
	3/8	SF-20-6		
	1/2	SF-20-8		
	5/8	SF-20-10		
.1935-.2280 #10-#1 4.90-5.80mm	*3/4	SF-20-12		
	*1	SF-20-16		
	*1-3/8	SF-20-22		
	1/4	SF-24-4		
	5/16	SF-24-5		
.2340-.2900 A-L 5.90-7.40mm	3/8	SF-24-6		
	1/2	SF-24-8		
	5/8	SF-24-10		
	3/4	SF-24-12		
	*1	SF-24-16		
	7/16 .4375-.4373	1/4	SF-28-4	TW-2
		5/16	SF-28-5	
		3/8	SF-28-6	
		1/2	SF-28-8	
		5/8	SF-28-10	
		3/4	SF-28-12	
		*1	SF-28-16	

* **INFO+:** Counterbored, leaving correct drill-bearing length and clearance (see page 510 for bearing length).



SLIP/FIXED RENEWABLE SF

ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW	
.1405-.1889 #28-3/16 3.60-4.75mm	1/2 .5000-.4998	5/16	SF-32-5	LS-1 RC-01 RK-01 RK-10	
		3/8	SF-32-6		
		1/2	SF-32-8		
		*3/4	SF-32-12		
		*1	SF-32-16		
		*1-3/8	SF-32-22		
		*1-1/2	SF-32-24		
		*1-3/4	SF-32-28		
		5/16	SF-32-5		
		3/8	SF-32-6		
.1890-.3438 #12-11/32 4.80-8.70mm	1/2 .5000-.4998	1/2	SF-32-8	LS-1 RC-01 RK-01 RK-10	
		3/4	SF-32-12		
		*1	SF-32-16		
		*1-3/8	SF-32-22		
		*1-1/2	SF-32-24		
		*1-3/4	SF-32-28		
		*2-1/8	SF-32-34		
		1/4	SF-36-4		TW-2
		5/16	SF-36-5		
		3/8	SF-36-6		
1/2	SF-36-8				
5/8	SF-36-10				
3/4	SF-36-12				
1	SF-36-16				
.2950-.3438 M-11/32 7.50-8.80mm	9/16 .5625-.5623	3/8	SF-40-6	TW-2	
		1/2	SF-40-8		
		5/8	SF-40-10		
		3/4	SF-40-12		
		1	SF-40-16		
		1-1/4	SF-40-20		
		3/8	SF-48-6		LS-1 RC-01 RK-01 RK-11
		1/2	SF-48-8		
		3/4	SF-48-12		
		1	SF-48-16		
1-3/8	SF-48-22				
1-1/2	SF-48-24				
1-3/4	SF-48-28				
2-1/8	SF-48-34				
*2-1/2	SF-48-40				
*3	SF-48-48				
.5469-.6562 35/64-21/32 13.50-16.50mm	7/8 .8750-.8748	1/2	SF-56-8	TW-7	
		5/8	SF-56-10		
		3/4	SF-56-12		
		1	SF-56-16		
		1-1/4	SF-56-20		
		1-1/2	SF-56-24		
.4688-.7812 15/32-25/32 12.00-19.50mm	1 1.0000-.9998	1/2	SF-64-8	LS-2 RC-02 RK-02 RK-12	
		3/4	SF-64-12		
		1	SF-64-16		
		1-3/8	SF-64-22		
		1-1/2	SF-64-24		
		1-3/4	SF-64-28		
		2-1/8	SF-64-34		
		2-1/2	SF-64-40		
		3	SF-64-48		

* INFO+: Counterbored, leaving correct drill-bearing length and clearance (see page 510 for bearing length).

ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW
.7188-1.0625 23/32-1-1/16 18.50-27.00mm	1-3/8 1.3750-1.3747	3/4	SF-88-12	LS-2 RC-02 RK-02 RK-12
		1	SF-88-16	
		1-3/8	SF-88-22	
		1-1/2	SF-88-24	
		1-3/4	SF-88-28	
		2-1/8	SF-88-34	
		2-1/2	SF-88-40	
		3	SF-88-48	
.9688-1.4062 31/32-1-13/32 25.00-35.00mm	1-3/4 1.7500-1.7497	3/4	SF-112-12	LS-3 RC-03 RK-03 RK-14
		1	SF-112-16	
		1-3/8	SF-112-22	
		1-1/2	SF-112-24	
		1-3/4	SF-112-28	
		2-1/8	SF-112-34	
		2-1/2	SF-112-40	
		3	SF-112-48	
1.3438-1.8750 1-11/32-1-7/8 35.00-47.00mm	2-1/4 2.2500-2.2496	3/4	SF-144-12	LS-3 RC-03 RK-03 RK-14
		1	SF-144-16	
		1-3/8	SF-144-22	
		1-1/2	SF-144-24	
		1-3/4	SF-144-28	
		2-1/8	SF-144-34	
		2-1/2	SF-144-40	
		3	SF-144-48	

For extended-range bushings (larger sizes) please see our web catalog.

Alignment Pins

Strength and Precision

- Wide assortment of quality ball lock and detent pins for precision alignment

- In steel or stainless steel
- A wide selection of other alignment pins are available



SFC SLIP/FIXED RENEWABLE CARBIDE



ID RANGE	OD	LENGTH	ANSI PART NO.	LOCK SCREW		
.0520-.0934 #55-#43 1.35-2.35mm	5/16 .3125-.3123	5/16	SFC-20-5	LS-1 RC-01 RK-01 RK-10		
		1/2	SFC-20-8			
		3/4	SFC-20-12			
		1	SFC-20-16			
.0935-.1562 #42-5/32 2.40-3.90mm		5/16	SFC-20-5			
		1/2	SFC-20-8			
		3/4	SFC-20-12			
		1	SFC-20-16			
.1406-.1889 9/64-3/16 3.60-4.75mm	1/2 .5000-.4998	5/16	SFC-32-5	LS-1 RC-01 RK-01 RK-10		
		1/2	SFC-32-8			
		3/4	SFC-32-12			
		1	SFC-32-16			
.1890-.3438 #12-11/32 4.80-8.70mm		1-3/8	SFC-32-22			
		5/16	SFC-32-5			
		1/2	SFC-32-8			
		3/4	SFC-32-12			
.2812-.5312 9/32-17/32 7.20-13.00mm	3/4 .7500-.7498	1	SFC-32-16	LS-1 RC-01 RK-01 RK-10		
		1-3/8	SFC-32-22			
		1/2	SFC-48-8			
		3/4	SFC-48-12			
.4688-.7812 15/32-25/32 12.00-19.50mm		1 1.0000-.9998	1		SFC-48-16	LS-2 RC-02 RK-02 RK-12
			1-3/8		SFC-48-22	
			1/2		SFC-64-8	
			3/4		SFC-64-12	
.7188-1.0312 23/32 - 1-1/32 18.50-27.00mm	1-3/8 1.3750-1.3747		1	SFC-64-16	LS-2 RC-02 RK-02 RK-12	
			1-3/8	SFC-64-22		
			1-3/4	SFC-64-28		
			1-3/4	SFC-88-12		
.9688-1.4062 31/32 - 1-13/32 25.00-35.00mm		1-3/4 1.7500-1.7497	1	SFC-88-16		LS-3 RC-03 RK-03 RK-14
			1-3/8	SFC-88-22		
			1-3/4	SFC-88-28		
			2-1/8	SFC-88-34		
1.3438-1.7812 1-11/32 - 1-25/32 35.00-45.00mm	2-1/4 2.2500-2.2496		2-1/2	SFC-88-40	LS-3 RC-03 RK-03 RK-14	
			3	SFC-112-48		
			1	SFC-112-16		
			1-3/8	SFC-112-22		
1.3438-1.7812 1-11/32 - 1-25/32 35.00-45.00mm		2-1/4 2.2500-2.2496	1-3/4	SFC-112-28		LS-3 RC-03 RK-03 RK-14
			2-1/8	SFC-112-34		
			2-1/2	SFC-112-40		
			3	SFC-144-48		
1.3438-1.7812 1-11/32 - 1-25/32 35.00-45.00mm	2-1/4 2.2500-2.2496		1	SFC-144-16	LS-3 RC-03 RK-03 RK-14	
			1-3/8	SFC-144-22		
			1-3/4	SFC-144-28		
			2-1/8	SFC-144-34		
1.3438-1.7812 1-11/32 - 1-25/32 35.00-45.00mm		2-1/4 2.2500-2.2496	2-1/2	SFC-144-40		LS-3 RC-03 RK-03 RK-14
			3	SFC-144-48		

Note: Due to manufacturing requirements, head dimensions of some carbide bushings may differ slightly from ANSI standards. Most carbide bushings have steel heads.



5-Axis Workholding

Quick-Change With No Adaptor Plates, Blocks Or Pallets Necessary



- Quintus fixture plates available as blank, or with multi-function holes
- German-built, extremely accurate precision vises
- Allows unrestricted tool access for multiple-side machining
- Numerous jaw types and sizes available



SLIP/FIXED RENEWABLE METRIC

SFM

ID RANGE (G6)	OD (h5)	LENGTH	ANSI PART NO.	LOCK SCREW
.35-1.00mm	8mm 8.000-7.994mm	*10mm	SFM-8-10	LSM-1 LSM-2 RCM-1 RCM-2
		*16mm	SFM-8-16	
1.01-1.80mm		10mm	SFM-8-10	
		16mm	SFM-8-16	
1.81-4.00mm		10mm	SFM-8-10	
		16mm	SFM-8-16	
4.01-6.00mm	10mm 10.000-9.994mm	12mm	SFM-10-12	LSM-3 LSM-4 RCM-3 RCM-4
		20mm	SFM-10-20	
		25mm	SFM-10-25	
6.01-8.00mm	12mm 12.000-11.992mm	12mm	SFM-12-12	LSM-3 LSM-4 RCM-3 RCM-4
		20mm	SFM-12-20	
		25mm	SFM-12-25	
8.01-10.00mm	15mm 15.000-14.992mm	16mm	SFM-15-16	LSM-3 LSM-4 RCM-3 RCM-4
		28mm	SFM-15-28	
		36mm	SFM-15-36	
10.01-12.00mm	18mm 18.000-17.992mm	16mm	SFM-18-16	LSM-5 LSM-6 RCM-5 RCM-6
		28mm	SFM-18-28	
		36mm	SFM-18-36	
12.01-15.00mm	22mm 22.000-21.991mm	20mm	SFM-22-20	LSM-5 LSM-6 RCM-5 RCM-6
		36mm	SFM-22-36	
		45mm	SFM-22-45	
15.01-18.00mm	26mm 26.000-25.991mm	20mm	SFM-26-20	LSM-5 LSM-6 RCM-5 RCM-6
		36mm	SFM-26-36	
		45mm	SFM-26-45	
18.01-22.00mm	30mm 30.000-29.991mm	25mm	SFM-30-25	LSM-5 LSM-6 RCM-5 RCM-6
		45mm	SFM-30-45	
		56mm	SFM-30-56	
22.01-26.00mm	35mm 35.000-34.989mm	25mm	SFM-35-25	LSM-7 LSM-8 RCM-7 RCM-8
		45mm	SFM-35-45	
		56mm	SFM-35-56	
26.01-30.00mm	42mm 42.000-41.989mm	30mm	SFM-42-30	LSM-7 LSM-8 RCM-7 RCM-8
		56mm	SFM-42-56	
		67mm	SFM-42-67	
30.01-35.00mm	48mm 48.000-47.989mm	30mm	SFM-48-30	LSM-7 LSM-8 RCM-7 RCM-8
		56mm	SFM-48-56	
		67mm	SFM-48-67	
35.01-42.00mm	55mm 55.000-54.987mm	30mm	SFM-55-30	LSM-7 LSM-8 RCM-7 RCM-8
		56mm	SFM-55-56	
		67mm	SFM-55-67	
42.01-48.00mm	62mm 62.000-61.987mm	35mm	SFM-62-35	LSM-7 LSM-8 RCM-7 RCM-8
		67mm	SFM-62-67	
		78mm	SFM-62-78	

ID RANGE (G6)	OD (h5)	LENGTH	ANSI PART NO.	LOCK SCREW
48.01-55.00mm	70mm 70.000-69.987mm	35mm	SFM-70-35	LSM-7 LSM-8 RCM-7 RCM-8
		67mm	SFM-70-67	
		78mm	SFM-70-78	
55.01-62.00mm	78mm 78.000-77.987mm	40mm	SFM-78-40	LSM-7 LSM-8 RCM-7 RCM-8
		78mm	SFM-78-78	
		105mm	SFM-78-105	
62.01-70.00mm	85mm 85.000-84.985mm	40mm	SFM-85-40	LSM-7 LSM-8 RCM-7 RCM-8
		78mm	SFM-85-78	
		105mm	SFM-85-105	
70.01-78.00mm	95mm 95.000-94.985mm	45mm	SFM-95-45	LSM-7 LSM-8 RCM-7 RCM-8
		89mm	SFM-95-89	
		112mm	SFM-95-112	
78.01-85.00mm	105mm 105.000-104.985mm	45mm	SFM-105-45	LSM-7 LSM-8 RCM-7 RCM-8
		89mm	SFM-105-89	
		112mm	SFM-105-112	

* Small metric drill sizes through .80mm are counterbored 1.00mm diameter, with 3mm drill-bearing length.

Toggle Clamps

**High Quality, Durable
And Made in the USA!**



- A fast, easy workholding option
- Made of durable high grade steel
- Many varieties available
- Comfortable handle grip