ADJUSTABLE LOCKNUTS

SPIETH

- POSITIVE LOCKING WITHOUT WASHERS AND KEYS
- SUPPORTS EXTREME THRUST LOADS

General:

Spieth Adjustable Locknuts adjust, preload, and secure bearings and other machine components on shafts and spindles with a high degree of stiffness. They permit the correct setting of the axial preload of bearings and ensure that the working loads are carried safely. The locknuts are secured positively without additional components, keys, or extra machining. The high load-carrying ability of the locknut is achieved through full 360° contact around the thread flanks guaranteeing a vice-grip locking effect. This contact around the full circumference ensures that the locknut will not loosen, even when subjected to extreme shock loads. This is an important feature, since locking with many commercially available locknuts relies on only one or a few "pinch" points on the circumference of the thread. Another advantage of the SPIETH locknut is the feature of aligning its contact face either with zero runout or, if necessary, adjusted to suit inaccuracies of in-line connecting components, thus compensating for minor errors of parallelism due to the stack-up of mating parts. Spindle runout, due to uneven bearing loading, can therefore be eliminated. A high degree of accuracy can be maintained even when repetitive tightening and loosening are required. The benefits of the SPIETH locknuts offer solutions for a wide range of general precision, heavy machinery, and equipment applications. The unique locking capability, with high stiffness and accuracy, is excellent for spindle applications - - especially suited for high speed and/or high dynamically-loaded spindles or mechanisms.

Thread sizes are equivalent to the standard bearing locknut series N/AN American Standard National Class 3 Fine, and metric sizes to ISO 5H fit. The widths approximate two N/AN locknuts. SPIETH SERIES MSW heavy-duty ADJUSTABLE LOCKNUTS are applied in conjunction with combined needle and roller thrust bearings, plain thrust bearings, or taper roller bearings, on ballscrews, worm drives, bevel gears, and other high-thrust-carrying components.

Design:

Two axially-arranged radial grooves, one from the outside and one from the inside, result in a diaphragm-like cross-section which gives the nut a predetermined axial elasticity. The internal groove divides the nut into a clamping and locking section. Depending on the nut size, three to eight axially arranged socket head cap screws are used to clamp the sections together. This eliminates the thread flank clearance between the shaft thread and locknut and allows for shockproof locking. Depending on the size and load capacity, two types of locknuts are available. For all MSR, MSA, and MSW sizes up to locknut 70.46, the axial bearing preload is adjusted by tightening the locknut through direct face contact. Size MSW 70.60 and larger use a number of clamping screws to reduce friction on the nut contact face, thus allowing for accurate preload adjustment. MSR Locknuts are made of alloy steel, MSW Locknuts are made of heat-treated alloy steel. Both locknut series have a black oxide finish for rust protection. The nut thread is manufactured to American Standard Class 3 Fine or ISO H5 fit. The contact face is machined square to the threads within .0002 in. Both types of locknuts are symmetrical in construction and are manufactured from solid stock. Threads and contact faces are machined by special single-point threading tools in one set-up to guarantee squareness. Balancing, therefore, is required only in extreme high-speed cases. The SPIETH Locknut's main feature is its capability to lock onto the threads over the entire 360-degree circumference.

PRELOADING NUTS: All MSR, MSA sizes, and MSW sizes up to 70.46:
These nuts have holes or slots on the outer diameter, which are suitable for available radial spanner wrenches. When the nuts are used in recessed applications, a tubular face spanner wrench with exposed prongs for MSW series and pins for MSR or MSA series is recommended. See Fig. 21 on page 10.

PRELOADING NUTS: Size MSW 72.60 and larger:
These nuts are screwed into position either by hand or by an available hook spanner wrench and locked into position without making face contact. Hardened clamping screws are then used axially for preloading; which, after adjusting, are secured in position by radial set screws through aluminum slugs. See Fig. 2 on page 3.

Mating Component:

MATING THREAD:
The shaft thread must be manufactured to American Class 3 "fine" or ISO Class 4h if applied for high-precision spindles or class "medium" or ISO class 6g for general applications. Surface roughness must be low to avoid compaction during shock loads.

MATING PARTS FOR LOCKNUTS UP TO SIZE MSW 70.46:
The preload torque is applied directly to the nut. However, means must be provided on the shaft to counter the torque. For optimum results, the accuracy of components assembled between the shaft, shoulder, and locknut contact face (bearing, gears, spacers, etc.) must be parallel and square to the bore within .0005" or better. In addition, the surface finish of the assembled components should be a minimum of 32 micro-inches or better in order to avoid surface compaction under load.

MATING PARTS FOR NUTS SIZE MSW 72.60 AND LARGER:
The axial preload applied through the hardened clamping screws must not act directly on the bearing face or soft surfaces. A thrust ring at least as thick as the bearing race should be sandwiched in between the bearing and locknut. The ring must be hardened, parallel, and square as specified above. If the design requires other components such as gears to be placed between the bearing and the locknut, again the accuracy must be held as specified above to avoid excessive deflection and surface compaction. If these components are hardened, the clamping screws can press directly against them without a thrust ring.

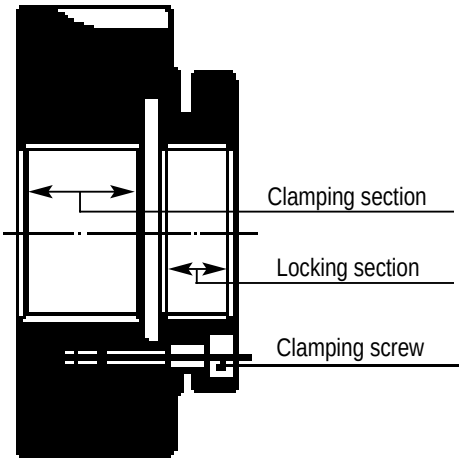


Fig. 1

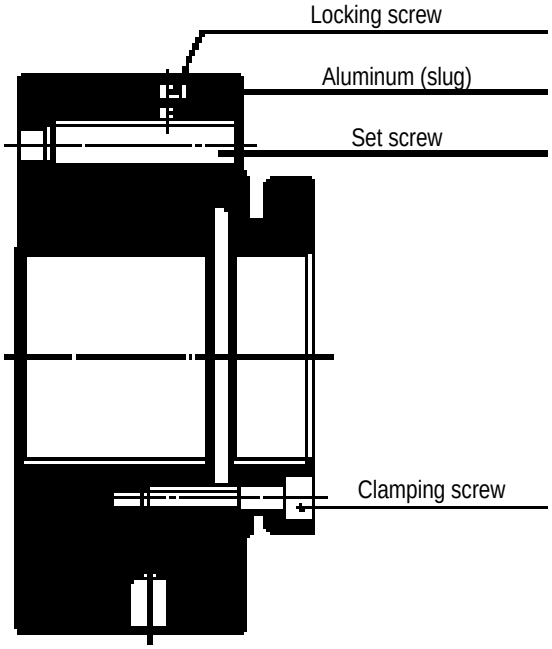


Fig. 2

Setting an axial pretensioning force:

The axial pretension of a threaded connection often plays a decisive role in successful function and must therefore be set with accuracy. However, in most assembly shops, direct measurement of this variable is not possible, making indirect methods of setting necessary. For this purpose, the locknut tightening torque corresponding to the required pretensioning force is calculated. This factor can be determined using the following equation.

For all MSR, MSA and MSW sizes up to 70.46:

$$Mv = (Fv + B)\,(A + \mu_A \cdot r_A)\,10^{-3}$$

Mv = Tightening torque of the locknut [Nm]
Fv = Required axial pretension force of the screw connection [N]
B = Locknut-specific allowance [N], compensates face end relief due to the locking process
A = Constant [mm], includes the calculation factors for the respective thread diameters (see table)
μ_A = Coefficient of friction for the face contact surface of the locknut. Approximate value $\mu_A = 0.1$ steel/steel
r_A = Effective mean friction radius for the face contact surface of the locknut [mm]

The locking process places the shaft thread under stress and develops intensive surface contact (=high axial rigidity). At the same time, this serves to relieve tension on the face contact surface of the locknut. This effect can be simply compensated for by increasing the tightening torque at assembly. This higher tightening torque is determined by using the allowance B relative to the required pretensioning force Fv.

For MSW size 72.60 and larger:

The tightening torque for the set screw is determined according to the following formula:

$$MD = \frac{Fv}{8}\,(A + \mu_D \cdot \frac{d_6}{4})\,10^{-3}$$

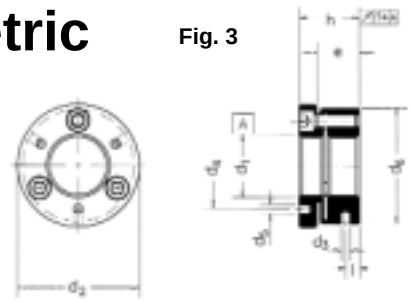
MD = Tightening torque per set screw [Nm]
Fv = Required axial pretensioning force of the screw connection [N]
A = Constant [mm], includes the calculation factors for the respective thread diameters (see table)
μ_D = Coefficient of friction for the face contact surface of the set screw. Approximate value = 0.13
d_6 = Dog point dia. of the set screw [mm] (see table)

Fig. 6

1 N ≙ 0.225 lbs
1 Nm ≙ 8.8583 in-lbs
1 inch ≙ 25.4 mm
kg cm² = $8.8583 \cdot 10^{-4}$ in-lbs-sec²

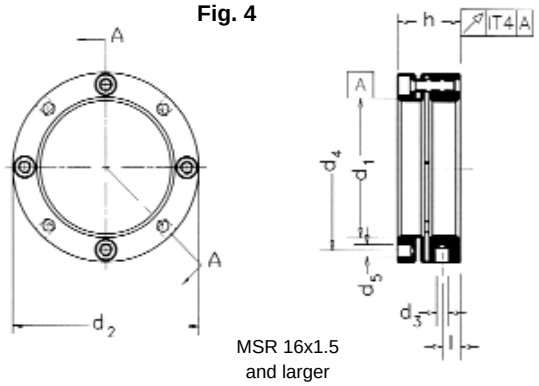
SPIETH Locknuts
Series MSR - Metric

Fig. 3



For sizes up
to MSR 15x1

Fig. 4



MSR 16x1.5
and larger

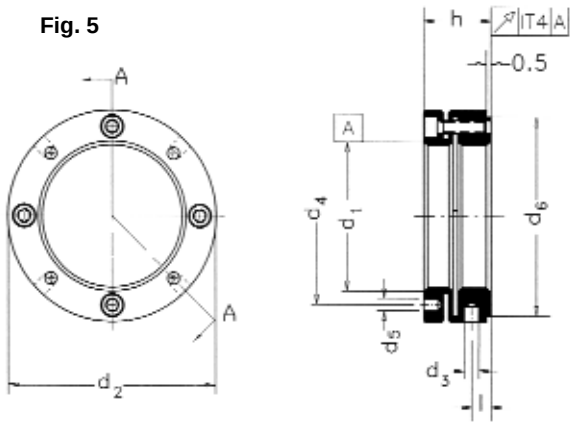
MSR (d_1 x pitch)	Dimensions in mm								Clamp screws			Calculation factor	Locknut-specific allowance	Allowable axial load		Mass moment of inertia
	d_2	d_3 1)	d_4	d_5 1)	d_6	h	l	e	Sizes	n	T_s	A	B	dyn.	stat.	J
ANSF class 3					h 11				SHCS	Qty	Nm	mm	N	kN	kN	kg cm²
10 x 0.75	24	2.5	17	3.2	22	14	3	6.5	M 3x10	3	2	0.672	2457	12	16	0.025
10 x 1	24	2.5	17	3.2	22	15	3	6.5	M 3x10	3	2	0.703	2457	12	15	0.027
12 x 1	26	3	19	3.2	25	14	3	6.5	M 3x10	3	2	0.819	2438	14	19	0.037
12 x 1.5	26	3	19	3.2	25	15	3	6.5	M 3x10	3	2	0.881	2438	13	18	0.040
14 x 1.5	32	4	22.5	4.3	30	16	3	7	M 4x10	3	2.9	0.997	2995	17	22	0.096
15 x 1	33	4	23.5	4.3	31	16	3	7	M 4x10	3	2.9	0.992	2984	19	25	0.108
16 x 1.5	34	4	24.5	4.3	-	18	5	-	M 4x12	4	2.9	1.112	3962	17	22	0.147
17 x 1	35	4	25.5	4.3	-	18	5	-	M 4x12	4	2.9	1.108	3947	19	25	0.164
18 x 1.5	36	4	26.5	4.3	-	18	5	-	M 4x12	4	2.9	1.228	3931	19	25	0.183
20 x 1	40	4	30.5	4.3	-	18	5	-	M 4x12	4	2.9	1.281	3900	22	29	0.283
20 x 1.5	40	4	30.5	4.3	-	18	5	-	M 4x12	4	2.9	1.344	3900	18	28	0.283
22 x 1.5	40	4	30.5	4.3	-	18	5	-	M 4x12	4	2.9	1.459	3869	23	32	0.270
24 x 1.5	42	4	32.5	4.3	-	18	5	-	M 4x12	4	2.9	1.575	3838	25	35	0.323
25 x 1.5	45	5	36.5	4.3	-	20	6.5	-	M 4x12	4	2.9	1.633	3822	33	47	0.488
26 x 1.5	45	5	36.5	4.3	-	20	6.5	-	M 4x12	4	2.9	1.690	3806	34	49	0.479
28 x 1.5	46	5	38.5	4.3	-	20	6.5	-	M 4x12	4	2.9	1.805	3775	36	53	0.504
30 x 1.5	48	5	40.5	4.3	-	20	6.5	-	M 4x12	4	2.9	1.921	3744	38	57	0.588
32 x 1.5	50	5	42.5	4.3	-	22	7	-	M 4x16	4	2.9	2.037	3713	44	64	0.743
35 x 1.5	53	5	45.5	4.3	-	22	7	-	M 4x16	4	2.9	2.210	3666	47	66	0.914
38 x 1.5	58	5	48.5	4.3	-	22	7	-	M 4x16	4	2.9	2.449	3619	50	75	1.337
40 x 1.5	58	5	50.5	4.3	-	22	7	-	M 4x16	4	2.9	2.500	3588	49	66	1.254
42 x 1.5	60	5	52.5	4.3	-	22	7	-	M 4x16	4	2.9	2.617	3557	49	66	1.412
45 x 1.5	68	6	58	4.3	-	22	6.5	-	M 4x16	6	2.9	2.789	5265	53	84	2.494
48 x 1.5	68	6	59.5	4.3	-	25	9	-	M 4x18	6	2.9	2.962	5195	70	94	2.631
50 x 1.5	70	6	61.5	4.3	-	25	9	-	M 4x18	6	2.9	3.079	5148	71	94	2.909
52 x 1.5	72	6	63.5	4.3	-	25	9	-	M 4x18	6	2.9	3.196	5101	72	96	3.207
55 x 1.5	75	6	66.5	4.3	-	25	9	-	M 4x18	6	2.9	3.369	5031	72	96	3.690
55 x 2	75	6	66.5	4.3	-	25	9	-	M4x18	6	2.9	3.369	5031	72	96	3.690
58 x 1.5	82	6	72.5	5.3	-	26	9	-	M 5x18	6	6	3.541	8077	122	161	5.811
60 x 1.5	84	6	74.5	5.3	-	26	9	-	M 5x18	6	6	3.655	8001	123	163	6.317
60 x 2	84	6	74.5	5.3	-	26	9	-	M 5x18	6	6	3.655	8001	123	163	6.317
62 x 1.5	86	6	76.5	5.3	-	28	10.5	-	M 5x20	6	6	3.774	7925	141	186	7.331
65 x 1.5	88	6	78.5	5.3	-	28	10.5	-	M 5x20	6	6	3.948	7811	134	177	7.708
65 x 2	88	6	78.5	5.3	-	28	10.5	-	M 5x20	6	6	3.948	7811	134	177	7.708
68 x 1.5	95	8	83	5.3	-	28	9.5	-	M 5x20	6	6	4.121	7696	168	223	11.048
70 x 1.5	95	8	85	5.3	-	28	9.5	-	M 5x20	6	6	4.238	7620	153	203	10.500
70 x 2	95	8	85	5.3	-	28	9.5	-	M 5x20	6	6	4.238	7620	153	203	10.500
72 x 1.5	98	8	86	6.4	-	28	8.5	-	M 6x20	6	10	4.354	10692	128	170	11.822
75 x 1.5	100	8	88	6.4	-	28	8.5	-	M 6x20	6	10	4.525	10530	121	160	12.346
75 x 2	100	8	88	6.4	-	28	8.5	-	M 6x20	6	10	4.525	10530	121	160	12.346
80 x 2	110	8	95	6.4	-	32	11	-	M 6x22	6	10	4.873	10260	194	258	22.033
85 x 2	115	8	100	6.4	-	32	11	-	M 6x22	6	10	5.168	9990	198	262	25.660
90 x 2	120	8	108	6.4	-	32	11	-	M 6x22	6	10	5.453	9720	200	265	29.615
95 x 2	125	8	113	6.4	-	32	11	-	M 6x22	6	10	5.744	9450	203	268	34.017
100 x 2	130	8	118	6.4	-	32	11	-	M 6x22	6	10	6.033	9180	205	271	38..838
105 x 2	135	8	123	6.4	-	32	11	-	M 6x22	6	10	6.321	8910	207	274	44.097
110 x 2	140	8	128	6.4	-	32	11	-	M 6x22	6	10	6.616	8640	212	280	49.814
115 x 2	145	8	133	6.4	-	36	13	-	M 6x25	6	10	6.900	8370	248	329	64.164
120 x 2	155	8	140	6.4	-	36	13	-	M 6x25	6	10	7.193	8100	308	408	89.668
125 x 2	160	8	148	6.4	-	36	13	-	M 6x25	6	10	7.474	7830	311	412	99.722
130 x 3	165	8	153	6.4	-	36	13	-	M 6x25	6	10	7.895	7560	306	405	110.500
140 x 3	180	10	165	6.4	-	36	12	-	M 6x25	8	10	8.475	9360	359	476	160.977
150 x 3	190	10	175	6.4	-	36	12	-	M 6x25	8	10	9.050	8640	369	489	192.954
160 x 3	205	10	185	8.4	-	40	14	-	M 8x30	8	25	9.633	14520	417	552	301.314
170 x 3	215	10	195	8.4	-	40	14	-	M 8x30	8	25	10.213	13200	423	560	353.347
180 x 3	230	10	210	8.4	-	40	14	-	M 8x30	8	25	10.789	11880	489	648	477.504
190 x 3	240	10	224	8.4	-	40	14	-	M 8x30	8	25	11.362	10560	495	656	550.330
200 x 3	245	10	229	8.4	-	40	14	-	M 8x30	8	25	11.948	9240	436	578	544.727

1) In same quantity as clamp screws.
Spanner wrenches available upon request.

Specifications are subject to change without notice.
Specials available upon request.

SPIETH Locknuts
Series MSA - Metric

Fig. 5



Designation of a locknut with
d_1 = M 20 x 1 :
Locknut MSA 20 x 1

The allowable axial loads specified in the table are guideline values calculated with a safety margin of 1.6

— under static load, based on the minimum yield point,
— under dynamic loads, based on the minimum fatigue strength.

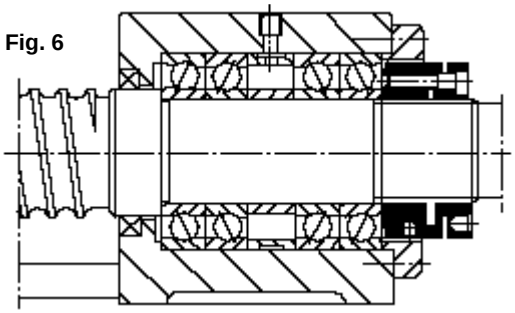
Series MSA Locknuts with reduced contact surface and in some cases smaller outside diameters relative to the MSR series are particularly suited for mounting angular ball bearings and cylinder roller bearings of ISO diameter series 9.

MSA size (d_1 x pitch)	Dimensions in mm							Clamp screws			Calculation factor	Locknut-specific allowance	Allowable axial load		Mass moment of inertia
	d_2	d_3 1)	d_4	d_5 1)	d_6	h	l	Sizes	n	T_s	A	B	dyn.	stat.	J
								SHCS	Qty	Nm	mm	N	kN	kN	kg cm²
20x1	35	4	27.5	3.2	31	17	5	M 3x12	5	2	1.281	3938	23	31	0.142
25x1.5	40	4	32.5	3.2	36	19	6.5	M 3x14	5	2	1.633	3859	35	49	0.265
30x1.5	45	5	37.5	3.2	41	19	6.5	M 3x14	5	2	1.921	3780	39	56	0.400
35x1.5	53	5	45.5	4.3	48	22	7	M 4x16	4	2.9	2.210	3666	47	66	0.904
40x1.5	58	5	50.5	4.3	54	22	7	M 4x16	4	2.9	2.500	3588	50	68	1.242
45x1.5	64	6	54	4.3	59	23	7	M 4x16	5	2.9	2.789	4388	58	78	1.888
50x1.5	69	6	59	4.3	64	24	8	M 4x16	6	2.9	3.079	5148	63	85	2.563
55x1.5	73	6	64	4.3	69	24	8	M 4x16	6	2.9	3.369	5031	59	79	3.001
60x1.5	78	6	69	4.3	74	24	8	M 4x16	6	2.9	3.655	4914	61	81	3.758
65x1.5	83	6	74	4.3	79	24	8	M 4x16	7	2.9	3.948	5597	94	124	4.611
70x1.5	93	8	83	5.3	88	27	9	M 5x20	6	6	4.238	7620	136	178	9.094
75x1.5	98	8	88	5.3	93	27	9	M 5x20	6	6	4.525	7430	138	183	10.866
80x2	103	8	93	5.3	98	28	10	M 5x20	6	6	4.873	7239	148	196	13.397
85x2	112	8	100	6.4	106	30	10	M 6x20	6	10	5.168	9990	172	228	21.260
90x2	117	8	105	6.4	111	30	10	M 6x20	6	10	5.453	9720	174	230	24.650
95x2	122	8	110	6.4	116	30	10	M 6x20	6	10	5.744	9450	176	232	28.384
100x2	130	8	118	6.4	123	32	11	M 6x22	6	10	6.033	9180	205	271	38.620
105x2	135	8	123	6.4	128	32	11	M 6x22	6	10	6.321	8910	207	274	43.852
110x2	140	8	128	6.4	133	32	11	M 6x22	6	10	6.616	8640	212	280	49.539
120x2	155	8	140	6.4	145	36	13	M 6x25	6	10	7.193	8100	308	408	89.148
130x3	165	8	153	6.4	155	36	13	M 6x25	6	10	7.895	7560	306	405	109.890
140x3	180	10	165	6.4	170	36	12	M 6x25	8	10	8.475	9360	359	476	160.150
150x3	190	10	175	6.4	180	36	12	M 6x25	8	10	9.050	8640	369	489	191.977
160x3	205	10	185	8.4	195	40	14	M 8x30	8	25	9.633	14520	417	552	300.080
170x3	215	10	195	8.4	205	40	14	M 8x30	8	25	10.213	13200	423	560	351.919
180x3	230	10	210	8.4	220	40	14	M 8x30	8	25	10.789	11880	489	648	475.748
190x3	240	10	224	8.4	230	40	14	M 8x30	8	25	11.362	10560	495	656	548.328
200x3	245	10	229	8.4	235	40	14	M 8x30	8	25	11.948	9240	436	578	542.596

1) In same quantity as clamp screws in Fig. 6 and Fig. 7.
Spanner wrenches available upon request.

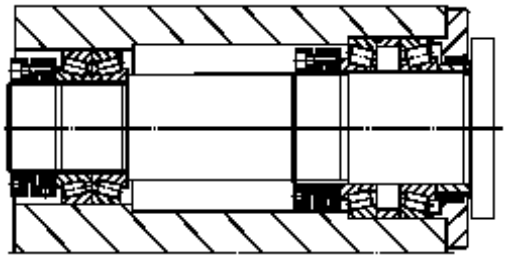
Specifications and dimensions are subject to change without notice.
Specials available upon request.

Fig. 6



This locknut provides a high degree of axial rigidity for the bearing assembly of a ballscrew. The locknut offers a particular advantage for fluctuating dynamic conditions.

Fig. 7



Tapered roller bearings require minimum runout and provide high axial rigidity. A radial force applied to tapered roller bearings will generate an axial force on the connecting components. Even if the preload is lost, the locknut remains safely locked.

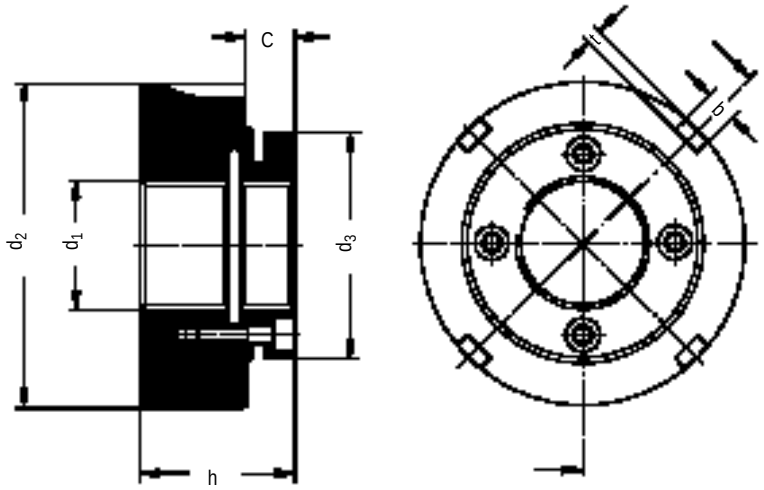
SPIETH Locknuts
Series MSW - Metric

Designation of a locknut with
d_1 = M 30 x 1.5 and length = 28 mm:
Locknut MSW 30.28

The allowable axial loads specified in the table are guideline values calculated with a safety margin of 1.6

— under static load, based on the minimum yield point,
— under dynamic loads, based on the minimum fatigue strength.

Fig. 8

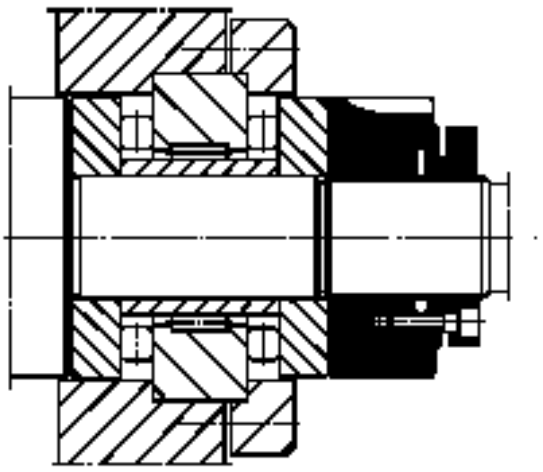


MSW size (thread x length)		Dimensions in mm							Clamp screws			Calculation factor	Locknut-specific allowance	Allowable axial load		Mass moment of inertia
		d_1 (d_1 x pitch)	d_2	d_3	h	C	b [1)]	t	Sizes	n	T_s	A	B	dyn.	stat.	J
		ISO - 5H							SHSC	Qty	Nm	mm	N	kN	kN	kg cm²
LIGHT SERIES	20 x 28	M 20x1.5	42	38	28	11	6	2.5	M 4x16	4	2.9	1.344	1560	57	80	0.4860
	25 x 28	M 25x1.5	47	43	28	11	7	3	M 4x16	4	2.9	1.633	1560	68	102	0.7419
	30 x 28	M 30x1.5	52	48	28	11	7	3	M 4x16	4	2.9	1.921	1560	77	123	1.0853
	35 x 28	M 35x1.5	60	53	28	11	8	3.5	M 4x16	4	2.9	2.210	1560	88	144	1.8034
	40 x 28	M 40x1.5	65	58	28	11	8	3.5	M 4x16	4	2.9	2.500	1560	97	165	2.4259
	45 x 28	M 45x1.5	70	63	28	11	8	3.5	M 4x16	6	2.9	2.789	2340	105	184	3.1432
	50 x 32	M 50x1.5	75	68	32	11	8	3.5	M 4x16	6	2.9	3.079	2340	147	267	4.7785
HEAVY SERIES	20 x 40	M 20x1.5	52	42	40	11	7	3	M 4x20	4	2.9	1.344	936	110	156	1.7401
	25 x 40	M 25x1.5	62	47	40	11	8	3.5	M 4x20	4	2.9	1.633	936	131	196	3.4125
	30 x 44	M 30x1.5	68	57	44	11	8	3.5	M 4x20	4	2.9	1.921	936	172	273	5.5377
	35 x 44	M 35x1.5	73	60	44	11	8	3.5	M 4x20	4	2.9	2.210	936	195	320	7.4069
	40 x 44	M 40x1.5	75	62	44	11	8	3.5	M 4x20	4	2.9	2.500	936	215	367	7.9830
	45 x 44	M 45x1.5	90	70	44	11	10	4	M 4x20	6	2.9	2.789	1404	234	410	16.4246
	50 x 46	M 50x1.5	95	75	46	11	10	4	M 4x20	6	2.9	3.079	1404	268	488	21.3395
	55 x 46	M 55x1.5	100	80	46	12	10	4	M 5x25	6	6.0	3.369	2286	272	504	23.5948
	60 x 46	M 60x1.5	100	85	46	12	10	4	M 5x25	6	6.0	3.655	2286	294	551	24.7692
	65 x 46	M 65x1.5	110	90	46	12	10	4	M 5x25	6	6.0	3.948	2286	314	598	35.8605
	70 x 46	M 70x1.5	115	95	46	12	10	4	M 5x25	6	6.0	4.238	2286	333	645	42.2151

1) In same quantity as clamp screws.
Spanner wrenches available upon request.

Specifications are subject to change without notice.
Specials available upon request.

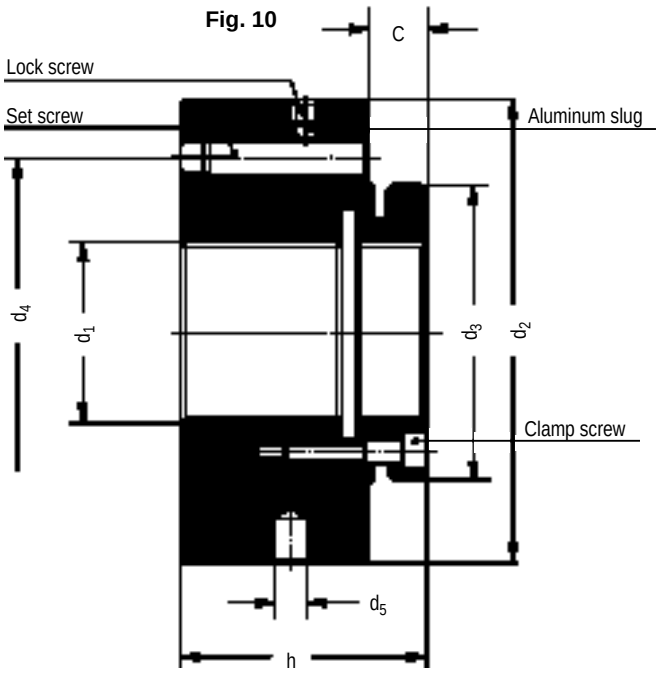
Fig. 9



The high loads are reliably transmitted to the feed drive thru the rigid locknut. The excellent locking properties of the locknut are of major importance under dynamic loads.

SPIETH Locknuts
Series MSW - Metric, Large

Fig. 10



Designation of a locknut with
d_1 = M 72 x 1.5 and length = 60 mm:
Locknut MSW 72.60

The allowable axial loads specified in the table are guide-line values calculated with a safety margin of 1.6

— under static load, based on the minimum yield point,
— under dynamic loads, based on the minimum fatigue strength.

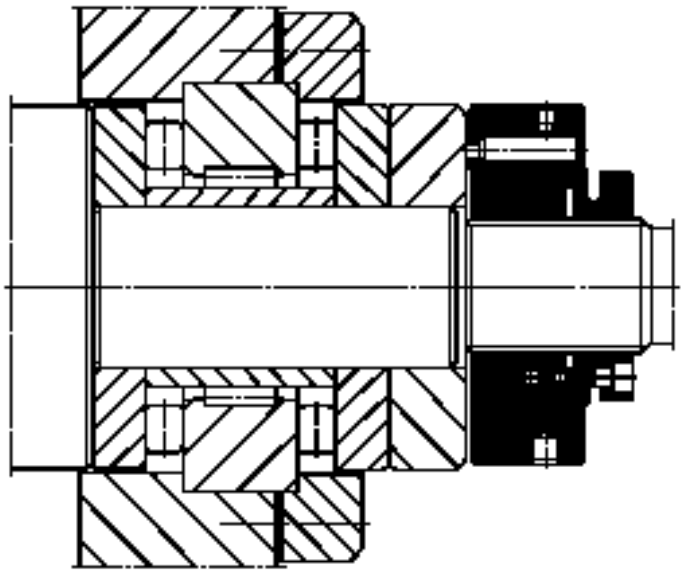
MSW size (thread x length)	Dimensions in mm						d_5		Clamp screws			Allowable axial load		Mass moment of inertia
	d_1 (d_1 x pitch)	d_2	d_3	h	C	d_4			Size	n_1	T_s	dyn.	stat.	J
	ISO - H5							Qty	SHCS	Qty	Nm	kN	kN	kg cm²
72 x 60	M 72x1.5	135	95	60	14	105	8	4	M 5x25	6	6	468	749	110.481
85 x 60	M 85x2	160	110	60	14	124	8	4	M 6x30	6	10	807	1050	218.131

MSW size (thread x length)	Preload set screw					Lock screw		Aluminum slug		
	Size	n	d_6	M_D 1)	Calculation factor A	Size	n_2	Ø	Length	n_3
	SHCS	Qty	mm	Nm	mm	SHCS	Qty	mm	mm	Qty
72 x 60	M 10x45	8	7	34	0.76575	M 6x8	8	4.5	3	8
85 x 60	M 12x45	8	8.5	60	0.91282	M 8x8	8	6	3	8

1) Recommended tightening torque by the screw manufacturer.
Spanner wrenches available upon request.

Subject to changes.
Specials available upon request.

Fig. 11



Typical Application

Because of friction, the larger MSW lock-nuts cannot produce the required axial preload using the nuts' own tightening torque. Axial preload is provided with the set-screws in the nut body.

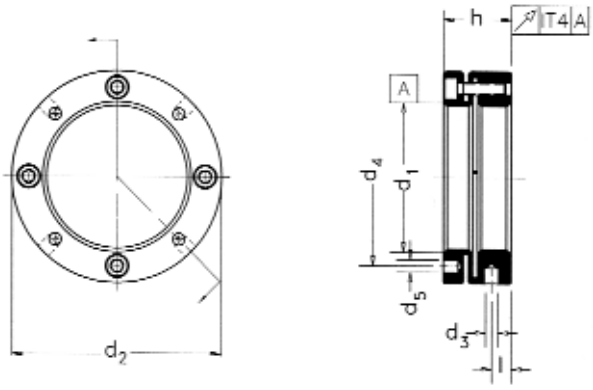
SPIETH Adjustable Locknuts
Series MSR - Inch

Designation of a locknut with
d_1 = 17mm x 32 threads/in.
Locknut MSR 17 x 32
d_1 = 5/8" x 18 threads/in.
Locknut MSR 5/8" x 18

The allowable axial loads specified in the table are guideline values calculated with a safety margin of 1.6

— under static load, based on the minimum yield point,
— under dynamic loads, based on the minimum fatigue strength.

Fig. 12



MSR (d_1 x thread) in	Equivalent bearing nut	Dimensions in inches						Clamp screws			Calculation factor	Locknut-specific allowance	Allowable axial load		Mass moment of inertia
		d_2	d_3 1)	d_4	d_5 1)	l	h	Sizes	n	T_s	A	B	dyn.	stat.	J
ANSF class 3								SHCS	Qty	in lbs	mm	N	kN	kN	kg cm²
17 x 32	N-03	1.38	.158	1.00	.169	.19	.70	M 4x12	4	25	1.092	3947	19	25	0.147
20 x 32	N-04	1.57	.158	1.12	.169	.19	.70	M 4x12	4	25	1.270	3900	22	29	0.283
25 x 32	N-05	1.77	.197	1.36	.169	.25	.78	M 4x12	4	25	1.524	3822	33	47	0.488
30 x 18	N-06	1.89	.197	1.52	.169	.25	.78	M 4x12	4	25	1.905	3744	38	57	0.588
35 x 18	N-07	2.09	.197	1.71	.169	.27	.86	M 4x16	4	25	2.210	3666	47	66	0.914
40 x 18	N-08	2.28	.197	1.91	.169	.27	.86	M 4x16	4	25	2.464	3588	49	66	1.254
45 x 18	N-09	2.68	.236	2.17	.169	.25	.86	M 4x16	6	25	2.769	5265	53	84	2.494
50 x 18	N-10	2.76	.236	2.30	.169	.35	.98	M 4x18	6	25	3.073	5148	71	94	2.909
55 x 18	N-11	2.95	.236	2.50	.169	.35	.98	M 4x18	6	25	3.353	5031	72	96	3.690
60 x 18	N-12	3.31	.236	2.78	.209	.35	1.02	M 5x18	6	40	3.632	8001	123	163	6.317
65 x 18	N-13	3.50	.236	2.97	.209	.41	1.10	M5x20	6	40	3.912	7811	134	177	7.708
70 x 18	N-14	3.74	.315	3.19	.209	.37	1.10	M5x20	6	40	4.217	7620	153	203	10.500
75 x 12	AN-15	3.94	.315	3.43	.252	.34	1.10	M 6x20	6	75	4.572	10530	121	160	12.346
80 x 12	AN-16	4.33	.315	3.62	.252	.43	1.26	M 6x22	6	75	4.877	10260	194	258	22.033
85 x 12	AN-17	4.53	.315	3.82	.252	.43	1.26	M 6x22	6	75	5.182	9990	198	262	25.660
90 x 12	AN-18	4.72	.315	4.06	.252	.43	1.26	M 6x22	6	75	5.436	9720	200	265	29.615
95 x 12	AN-19	4.92	.315	4.25	.252	.43	1.26	M 6x22	6	75	5.741	9450	203	268	34.017
100 x 12	AN-20	5.12	.315	4.45	.252	.43	1.26	M 6x22	6	75	6.020	9180	205	271	38.838
105 x 12	AN-21	5.31	.315	4.65	.252	.43	1.26	M 6x22	6	75	6.325	8910	207	274	44.097
110 x 12	AN-22	5.51	.315	4.84	.252	.43	1.26	M 6x22	6	75	6.604	8370	248	239	64.164
120 x 12	AN-24	6.10	.315	5.32	.252	.51	1.41	M 6x25	6	75	7.188	8100	308	408	89.668
130 x 12	AN-26	6.50	.315	5.71	.252	.51	1.41	M 6x25	6	75	7.772	7560	306	405	110.500
140 x 12	AN-28	7.09	.394	6.10	.252	.47	1.41	M 6x25	8	75	8.331	9360	359	476	160.977
150 x 12	AN-30	7.50	.394	6.50	.252	.47	1.41	M 6x25	8	75	8.915	8640	369	489	197.954
160 x 8	AN-32	8.07	.394	7.08	.331	.55	1.57	M 8x30	8	155	9.652	14520	417	552	301.314
170 x 8	AN-34	8.50	.394	7.40	.331	.55	1.57	M 8x30	8	155	10.185	13200	423	560	353.347
180 x 8	AN-36	9.06	.394	8.87	.331	.55	1.57	M 8x30	8	155	10.770	11880	489	648	477.504
190 x 8	AN-38	9.45	.394	8.27	.331	.55	1.57	M 8x30	8	155	11.405	10560	495	656	550.330
200 x 8	AN-40	9.65	.394	8.58	.331	.55	1.57	M 8x30	8	155	11.938	9240	436	578	544.727
AMERICAN STANDARD CLASS 3 FIT															
5/8" x 18	—	1.38	.187	.96	.187	.19	.70	8-32 x .50	4	25	1.092	3962	19	25	0.147
3/4" x 16	—	1.56	.187	1.12	.187	.19	.70	8-32 x .50	4	25	1.295	3916	22	29	0.283
7/8" x 14	—	1.56	.187	1.20	.187	.19	.70	8-32 x .50	4	25	1.524	3869	23	32	0.270
1" x 12	—	1.75	.187	1.36	.187	.25	.78	8-32 x .50	4	25	1.702	3822	33	47	0.488
1-1/8" x 12	—	1.88	.187	1.44	.187	.25	.78	8-32 x .50	4	25	1.905	3775	36	53	0.504
1-1/4" x 12	—	2.00	.201	1.60	.187	.27	.86	8-32 x .50	4	25	2.108	3713	44	64	0.743
1-3/8" x 12	—	2.12	.201	1.71	.187	.27	.86	8-32 x .63	4	25	2.286	3666	47	66	0.914
1-1/2" x 12	—	2.25	.201	1.83	.187	.27	.86	8-32 x .63	4	25	2.464	3620	50	75	1.337
1-5/8" x 12	—	2.38	.201	1.98	.187	.27	.86	8-32 x .63	4	25	2.642	3572	49	66	1.254
1-3/4" x 12	—	2.69	.201	2.17	.187	.25	.86	8-32 x .63	6	25	2.820	5265	53	84	2.494
1-7/8" x 12	—	2.69	.250	2.23	.187	.26	.86	8-32 x .63	6	25	3.023	5195	70	94	2.631
2" x 12	—	2.75	.250	2.34	.187	.35	.98	8-32 x .75	6	25	3.200	5125	72	96	2.909
2-1/4" x 12	—	3.00	.250	2.58	.187	.35	.98	8-32 x.75	6	25	3.581	8077	122	161	5.811
2-1/2" x 12	—	3.50	.328	2.94	.219	.38	1.10	10-32 x.75	6	40	3.937	7849	135	175	7.331
2-3/4" x 12	—	3.75	.328	3.19	.219	.37	1.10	10-32 x.75	6	40	4.318	7620	153	203	10.500
3" x 12	—	4.00	.328	3.49	.281	.33	1.10	1/4-20 x.75	6	75	4.674	10476	136	180	12.346

1) In same quantity as clamp screws.
Spanner wrenches available upon request.

Specifications are subject to change without notice.
Specials available upon request.

Special Locknuts with American Standard Threads are made to your specifications. We invite you to furnish a sketch or lay-out indicating your design specifications. We will submit recommendations and application sketches to guarantee an optimum design.

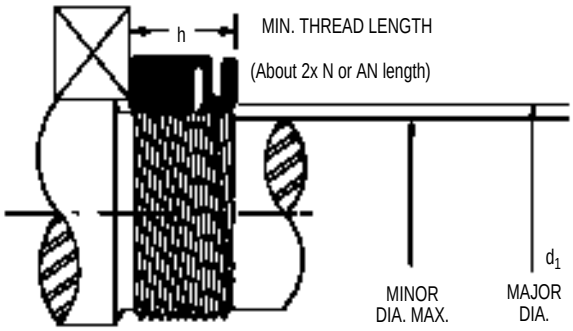
MALE THREAD DATA

AMERICAN NATIONAL STD. FINE-CLASS 3 FIT
Limiting Dimensions for External Threads (Bolts)
to Suit Spieth Adjustable Locknuts

Dimensions in Inches

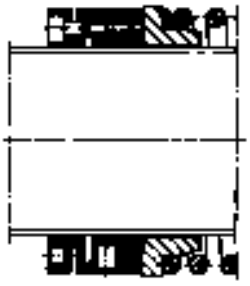
SPIETH MSR Locknut	Equiv. lock-nut no.	Major dia.		Minor dia.-max.	Pitch dia.		h
		Max.	Min.		Max.	Min.	
Special	N-00	.391	.386	.3527	.3707	.3681	.75
Special	N-01	.469	.464	.4307	.4487	.4461	.75
Special	N-02	.586	.581	.5477	.5657	.5627	.75
17x32	N-03	.664	.659	.6257	.6437	.6407	.75
20x32	N-04	.781	.776	.7427	.7607	.7573	.75
25x32	N-05	.969	.964	.9307	.9487	.9453	.75
30x18	N-06	1.173	1.165	1.1048	1.1369	1.1329	.81
35x18	N-07	1.376	1.368	1.3078	1.3399	1.3359	.88
40x18	N-08	1.563	1.555	1.4948	1.5269	1.5224	.88
45x18	N-09	1.767	1.759	1.6988	1.7309	1.7264	.88
50x18	N-10	1.967	1.959	1.8988	1.9309	1.9264	1.06
55x18	N-11	2.157	2.149	2.0888	2.1209	2.1158	1.06
60x18	N-12	2.360	2.352	2.2918	2.3239	2.3188	1.06
65x18	N-13	2.548	2.540	2.4798	2.5119	2.5068	1.12
70x18	N-14	2.751	2.743	2.6828	2.7149	2.7098	1.12
75x12	AN-15	2.933	2.922	2.8308	2.8789	2.8735	1.12
80x12	AN-16	3.137	3.126	3.0348	3.0829	3.0770	1.28
85x12	AN-17	3.340	3.329	3.2378	3.2859	3.2785	1.28
90x12	AN-18	3.527	3.516	3.4248	3.4729	3.4655	1.28
95x12	AN-19	3.730	3.719	3.6278	3.6759	3.6685	1.28
100x12	AN-20	3.918	3.907	3.8158	3.8639	3.8565	1.28
105x12	AN-21	4.122	4.111	4.0198	4.0679	4.0596	1.28
110x12	AN-22	4.325	4.314	4.2228	4.2709	4.2626	1.28
120x12	AN-24	4.716	4.705	4.6138	4.6619	4.6536	1.50
130x12	AN-26	5.106	5.095	5.0038	5.0519	5.0436	1.50
140x12	AN-28	5.497	5.486	5.3948	5.4429	5.4346	1.50
150x12	AN-30	5.888	5.877	5.7858	5.8339	5.8256	1.50
160x 8	AN-32	6.284	6.269	6.1306	6.2028	6.1937	1.62
170 x 8	AN-34	6.659	6.644	6.5056	6.5778	6.5687	1.62
180x 8	AN-36	7.066	7.051	6.9126	6.9848	6.9757	1.62
190x 8	AN-38	7.472	7.457	7.3186	7.3908	7.3817	1.62
200x 8	AN-40	7.847	7.832	7.6936	7.7658	7.7544	1.62

Fig. 13



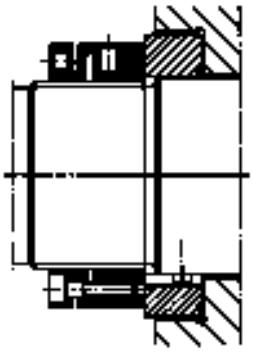
SPIETH MSR Locknut	Major dia.		Minor dia.-max.	Pitch dia.		h
	Max.	Min.		Max.	Min.	
5/8"-18	.625	.6168	.5568	.5889	.5859	.75
3/4"-16	.750	.7410	.6733	.7094	.7062	.75
7/8"-14	.875	.8652	.7874	.8286	.8250	.75
1"-12	1.000	.9886	.8978	.9459	.9415	.75
1-1/8"-12	1.125	1.1136	1.0228	1.0709	1.0664	.81
1-1/4"-12	1.250	1.2388	1.1478	1.1959	1.1919	.88
1-3/8"-12	1.375	1.3638	1.2728	1.3209	1.3169	.88
1-1/2"-12	1.500	1.4888	1.3978	1.4459	1.4419	.88
1-5/8"-12	1.625	1.6138	1.5228	1.5709	1.5664	.88
1-3/4"-12	1.750	1.7388	1.6478	1.6959	1.6913	.88
1-7/8"-12	1.875	1.8638	1.7728	1.8209	1.8163	.88
2"-12	2.000	1.9888	1.8978	1.9459	1.9412	1.06
2-1/4"-12	2.250	2.2388	2.1478	2.1959	2.1911	1.06
2-1/2"-12	2.500	2.4888	2.3978	2.4459	2.4410	1.12
2-3/4"-12	2.750	2.7388	2.6478	2.6959	2.6909	1.12
3"-12	3.000	2.9888	2.8978	2.9459	2.9408	1.12

Fig. 14



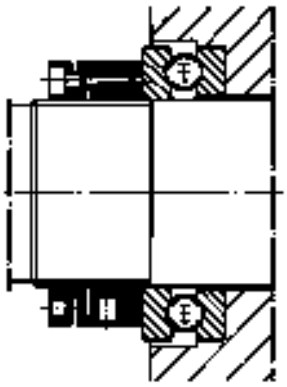
Axial positioning of spring on shaft.

Fig. 15



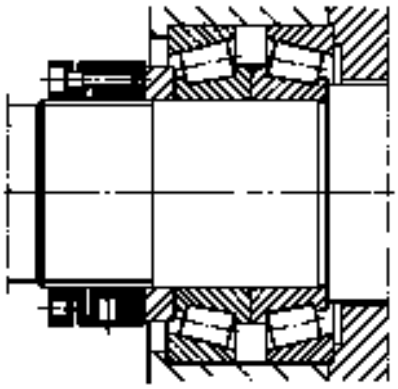
Axial play adjustment on thrust washer.

Fig. 16



Adjustment of axial thrust bearings.

Fig. 17



Ball screw end mounting.

ASSEMBLY OF SPIETH ADJUSTABLE LOCKNUTS:

Note that the locking screws can only be tightened when the nut is engaged entirely on the male thread to avoid distortion of the locknut. Clean and oil the thread before engaging the nut. Once a Spieth locknut has been preloaded and locked on a thread, it should not be put on another thread. Otherwise, high adjustment accuracy might not be achievable.

For all MSR, MSA and up to size 70.46 MSW Locknuts: With locking screws D loose, screw the locknut on to the shaft thread C until it is within .100" of the mating face E (Fig. 18).

With an Allen wrench, slightly tighten each locking screw D crosswise and uniformly until the locknut is barely turnable by hand (the flank clearance is nearly eliminated). In this condition, the centerline of the locknut has coincided with the centerline of the spindle, the mating face A is perpendicular to the common centerline, and the thread flanks of the locknut are in uniform contact over the full circumference of both the clamping and locking section (Fig. 19).

With a spanner wrench, tighten the locknut against the mating face E, with three to five times the required preload to prestretch the threads, eliminating any subsequent compaction of nut, shaft threads and contact surfaces. (Radial or face spanner wrenches are available upon request). Then loosen the locknut and torque to the desired preload.

Secure the locknut in position by tightening the locking screws D gradually, evenly, and crosswise. Face and radial runout of the mating component caused by summation of small errors in parallelism in the connecting parts can be eliminated by individually adjusting the locking screws (Fig. 23).

To release a SPIETH Adjustable Locknut, slightly loosen the locking screws D crosswise before completely releasing all screws to avoid binding the last screw.

The locknut can be easily tightened or loosened by means of a modified Allen wrench or by a special tube wrench with prongs or pins when assembly and disassembly must take place axially. (Fig. 21, 22)

For heavy preload, use radial spanner holes rather than face spanner holes to avoid deflection of the membrane of the locknut.

Fig. 18

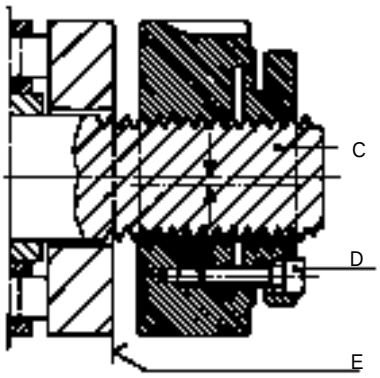
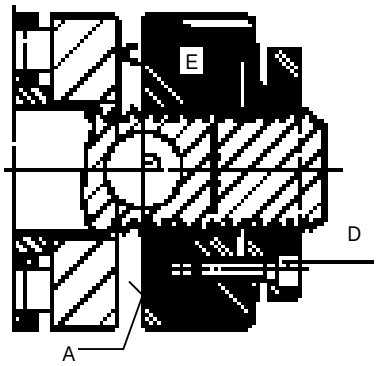


Fig. 19



ASSEMBLY INSTRUCTIONS FOR SIZE MSW 72.60 AND LARGER: (Large Series)

Follow instructions in paragraphs 2 and 3 above.

At this point, the locknut is at a distance of about .1" from the mating face E. Secure by tightening the locking screws D to the required T_S torque. Then tighten the clamping screws F against the hardened mating face E crosswise - - initially three to five times the required torque. This eliminates any subsequent compaction of nut, spindle threads and contact surfaces. Loosen the clamping screws F again and subsequently tighten to the required MD preload torque. Finally, tighten the set screws G and check the locking screws D once more to ensure the required T_S torque setting. (Fig. 20)

To release the locknut, first loosen the set screws G, then slightly loosen the clamping screws F in sequence and only subsequently loosen these screws completely in a crosswise manner. This procedure avoids binding of the last screw. Release clamp screws D in a crosswise manner.

Fig. 20

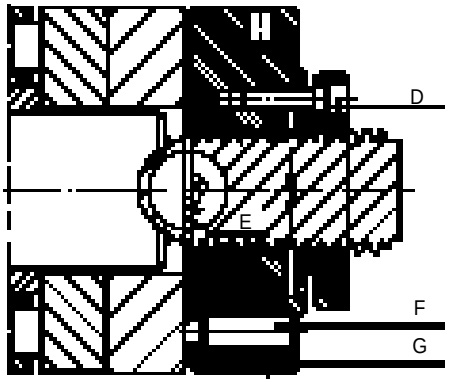
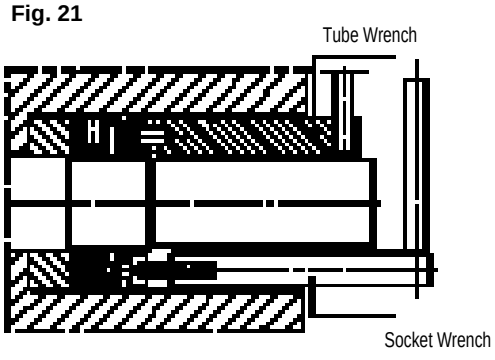


Fig. 21



Special wrenches for tightening clamp screws on recessed locknuts.

Fig. 22

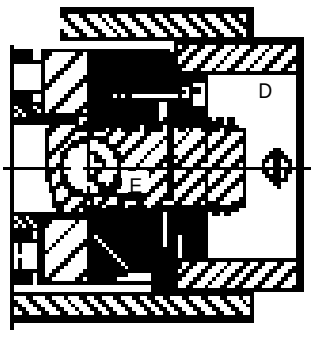
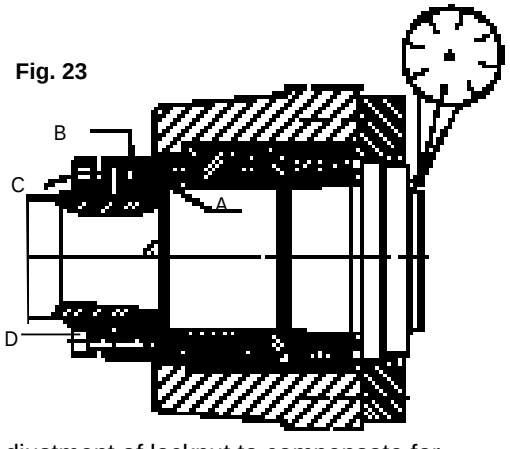


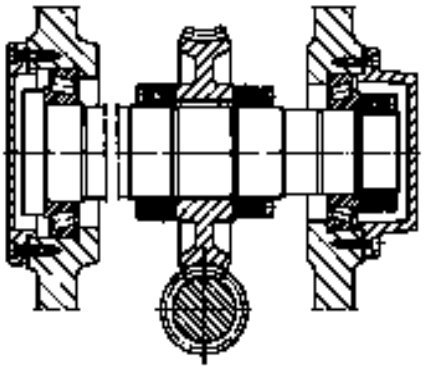
Fig. 23



Adjustment of locknut to compensate for minor inaccuracy of mating parts.

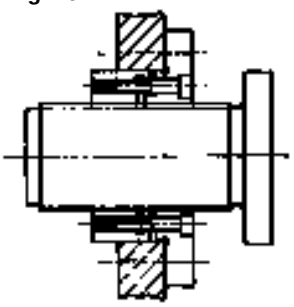
APPLICATIONS FOR SPIETH ADJUSTABLE LOCKNUTS

Fig. 24



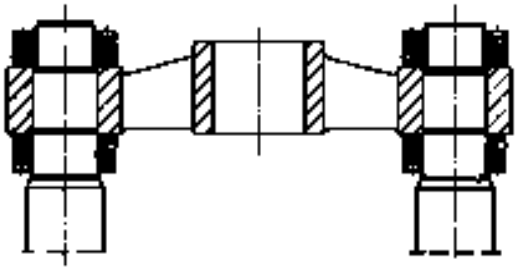
Adjustment of worm gear and bearings.

Fig. 25



SPIETH special flange-type locknut with adjustable positioning of stop screw. Locknut is locked positively in any position.

Fig. 26

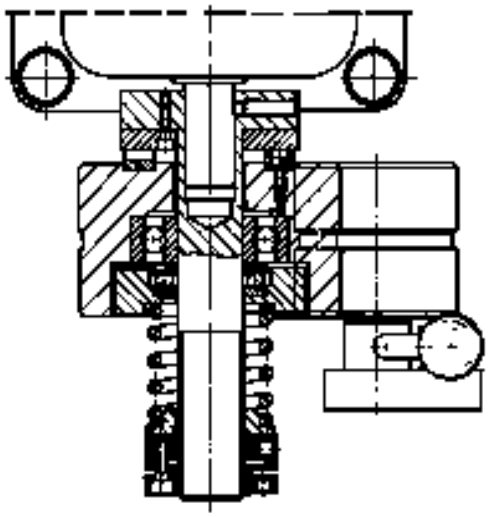


SPIETH Locknuts applied to provide adjustable support surfaces for a four-post ram plate.

The distance and the parallelism are accurately established by means of backlash-free locknuts.

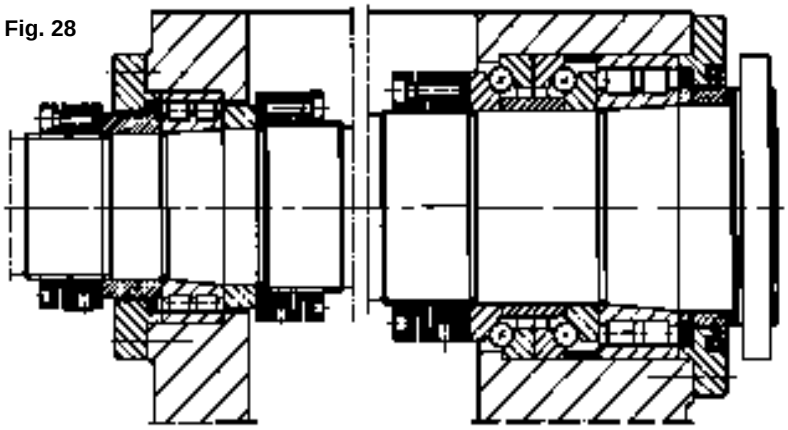
Squareness of the nut contact faces are easily adjusted. Deflection and misalignment of the guide posts will therefore be eliminated when the counter nuts are tightened.

Fig. 27



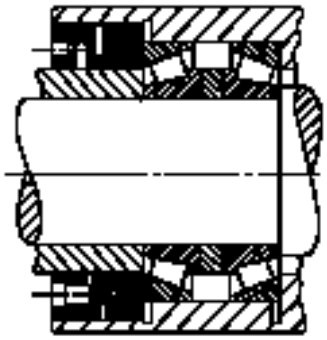
Fine adjustment and reliable locking are essential requirements on this slipclutch assembly of a fully automated zipper assembly machine. The SPIETH Locknut, incorporating such features, permits positioning and locking in any axial location on the threaded shaft.

Fig. 28



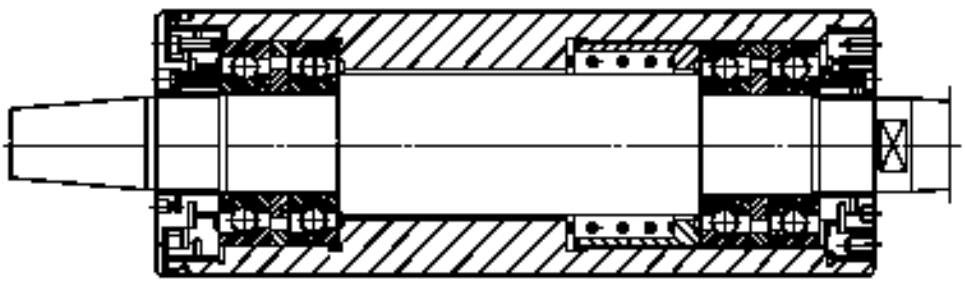
Head spindle assembly with double row roller and thrust bearings: Adjustment of axial preload accomplished with SPIETH Adjustable Locknuts.

Fig. 29



Special SPIETH Adjustable Lockscrew for preloading taper ball bearings.

Fig. 30



Special SPIETH Lockscrews incorporating such features as labyrinth grooves and other configurations may be supplied to satisfy specific machine designs.

The SPIETH Family
Of Shaft Connectors & Guides

Spieth Hydraulically Actuated Guide and Clamping Sleeves for automatic and concentric clamping of quills, shafts, etc.

Spieth Clamping Sleeves provide keyless, shrink-fit connections.

Spieth precision Adjustable Locknuts provide vise-like locking without washers and keys.

Spieth Adjustable Hydrodynamic Guide Bushings provide accurate guiding, adjustable guide clearance, hydrodynamic lubrication effect. Linear and rotary applications.

Spieth Hydrodynamic Expansion Gibs reduce the cost of machining and scraping, reduce vibration and chatter, and compensate for minor machining inaccuracies on machine slides.

Contact us for a free copy of any Spieth component catalog:

ADVANCED MACHINE & ENGINEERING CO.

2500 Latham Street • Rockford, IL 61103
Phone 815/962-6076 • Fax 815/962-6483
E-Mail: info@ame.com

Your Local Advanced Representative Is:

TL-SL-0105