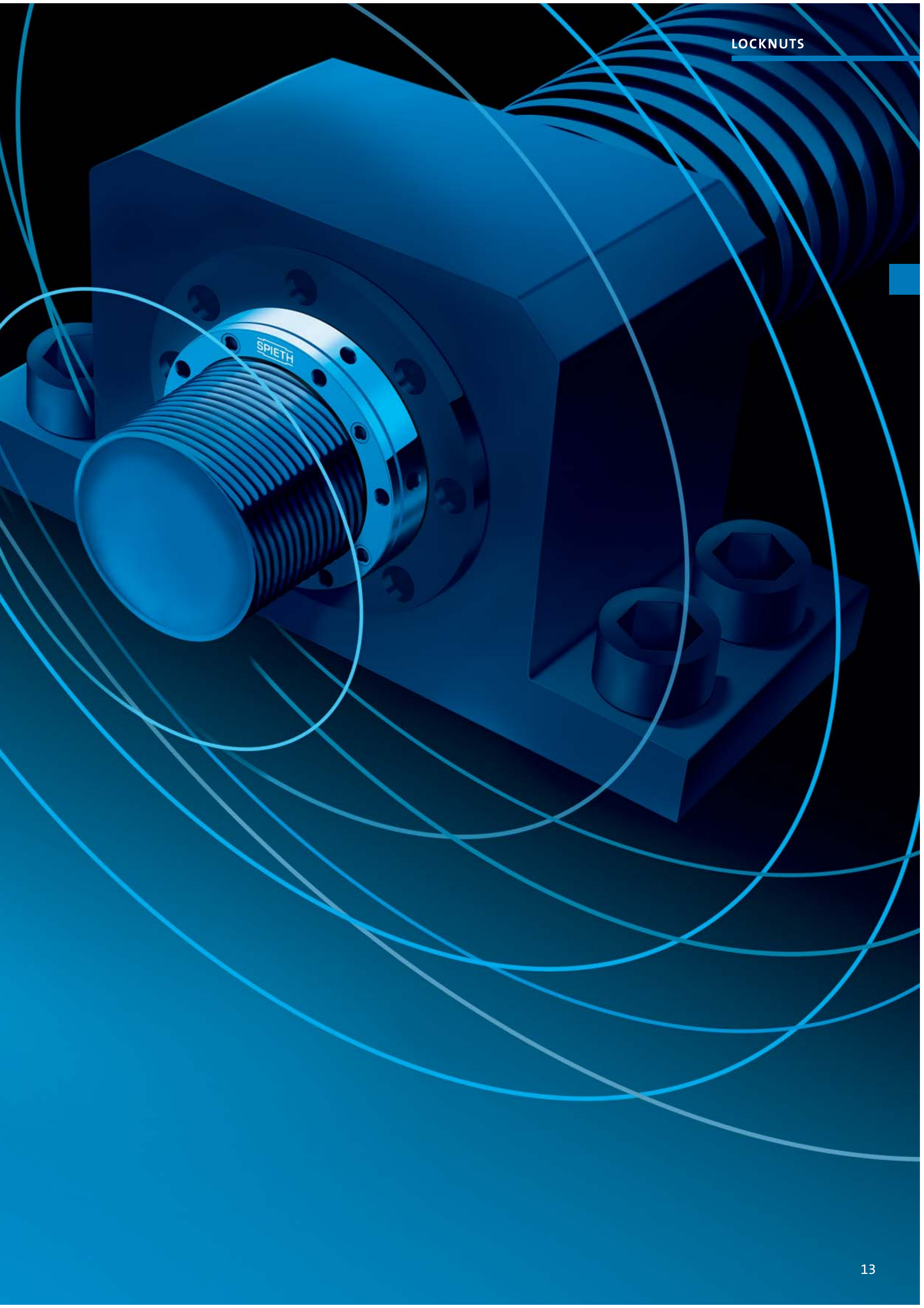
HOLDING PRECISLY IN POSITION WHEN THINGS GET GOING

Spieth locknuts – precision nuts by design.
With exceptional precision and uniform clamping forces at the thread flanks, Spieth locknuts can be exactly adjusted to perform demanding duties in mechanical engineering. Thanks to perfect functionality, they cope without difficulty with the increasing levels of dynamic stress and power densities inherent in modern machinery designs – and are therefore designed to deliver maximum economy.

Locknuts demonstrate their strength when things really get going: They ensure optimum concentricity of spindles. The locknut owes its unique capability to a combination of manufacturing precision and the diaphragm locking system developed by Spieth. The relevant functional components such as the load thread, locking thread and end face are inseparable components of the nut body and are manufactured to a high degree of precision as a clamping device. The diaphragm lock ensures that this precision is preserved when assembled in your application result and that it is also retained throughout its operation.


SPIETH

4 UNIQUE FEATURES – NUMEROUS BENEFITS

Secure

The locking system enables the application of high clamping forces to ensure that the nut is friction-locked onto the spindle thread. The load is applied to the thread across 360° symmetrically and evenly. The locking force and working load act in the same direction and cannot cancel each other out. This is the requirement for the highest locking effect while at the same time preserving the connecting components.

Self-centering

The locking procedure is designed to exert a self-centring effect for the nut on the spindle thread. This is the prerequisite for ensuring a coaxial end position of the nut relative to the spindle and for a vertical orientation of the end face with respect to the connection assembly. For demanding applications, this effect can be used in a separate installation step specifically to minimise thread join play.

Precise

All functional surfaces that determine precision are manufactured in a single set-up. And in contrast to other locking concepts, the precision is retained by design once it has been created, even during installation and operation.

Consistent rigidity

Irrespective of the degree of pretension in the nut, the closed distribution of locking force ensures an intensive application of the thread flanks in the direction of the working load. The assembly process creates an elastic pretension in the join of the thread pairing, as a result of which the bearing area of the thread flanks and the rigidity of the join are significantly increased. Damaging micro-movements, caused by strong impulses or abrupt changes in the direction of force, are drastically reduced.

BENEFITS TO YOU

Competitiveness through technological leadership – a strategy that calls for an economical increase in power density, efficiency and accuracy. Locknuts create the foundation for this.

Lower resource input

- No additional grooves or locking plates required.
- Free, infinitely variable and exact positioning.
- Fast, precise installation results.
- Simple to dismantle thanks to back-sprung diaphragm.

More success

- Optimum locking effect.
- High degree of run-out accuracy, even in the assembled state.
- High dynamic loading capacity.
- High dynamic rigidity.
- Dynamically balanced structure.
- Suitable for high speeds.

Series MSR large

Series MSR standard

Series MSR from size M10

FIELDS OF APPLICATION

Spieth locknuts are precision nuts fitted with an integrated premium thread lock.
They are used in all areas of mechanical engineering. Precision, safety, rigidity and ease of use are key aspects in the design of a threaded connection. Spieth nuts are the first choice whenever at least one of these aspects is required.

APPLICATION EXAMPLES

- In machining, forming and cutting machine tools.
- In handling and automation equipment.
- In materials handling.
- In general drive engineering and transmissions.
- In fixture construction.
- In packaging machinery.
- In compressors and pumps.
- In printing presses and paper-making technology.
- In textile machines.
- In woodworking machines.
- In press manufacturing.
- In process engineering applications for mixing, crushing and centrifuging.
- For metrology, control and test engineering.

Series MSA

Series MSF

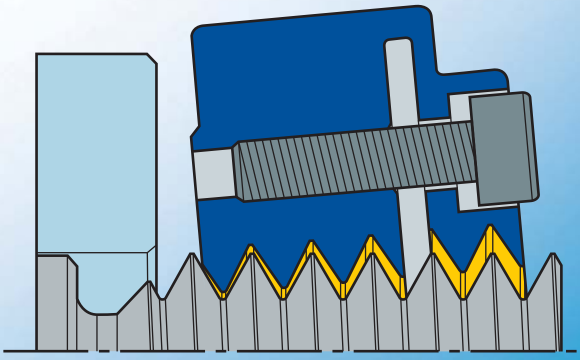
Series MSW

Series MSW > M70

FUNCTIONAL PRINCIPLE

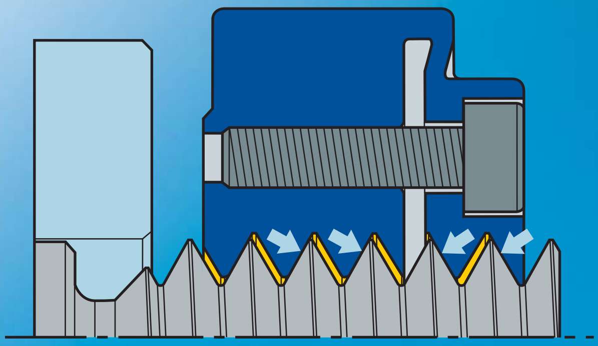
In this example, based on a type MSF locknut.

The principle is illustrated in a simplified diagram with enlarged thread flank play.



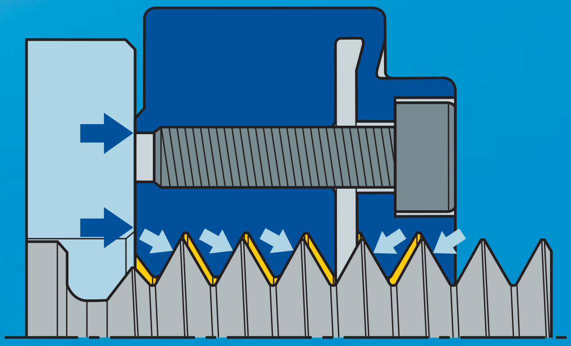
1. Screwing on the locknut

As with every threaded connection, there is a degree of mating play when the nuts are screwed on. As a result, the nut may be aligned with a parallel and/or angled axial offset relative to the spindle axis; in other words, the contact surface of the nut may be at an incline.



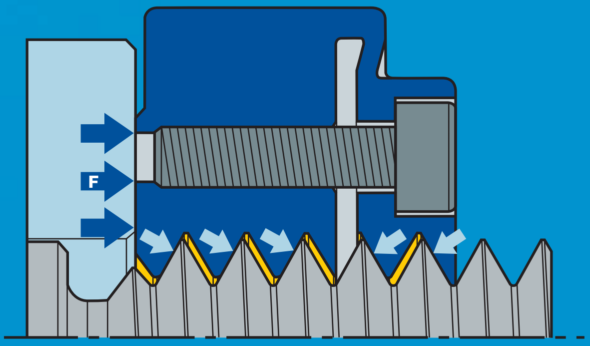
2. Spieth locknuts: Self-centring and self-aligning thanks to play restriction

Unique: Spieth locknuts are automatically self-centring and eliminate mating play (thread flank play) as far as possible. Thanks to play restriction, the locknut centres itself and the contact surface of the engages at right angles to the spindle axis.



3. Tightening and locking

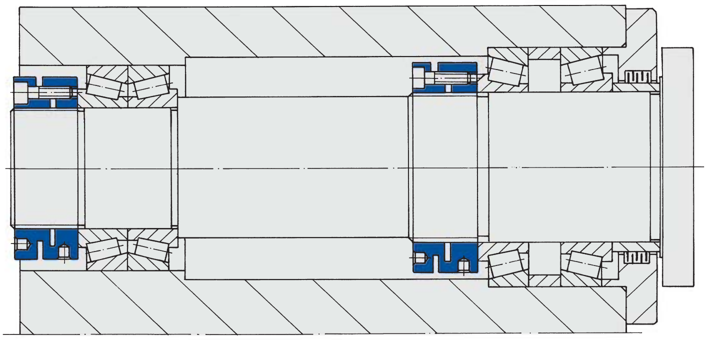
The locknut is tightened with the required level of preliminary torque. The lock screws are then locked with the specified level of locking torque. This ensures optimum contact at the thread flanks and maximum concentricity.



4. Higher levels of operational safety

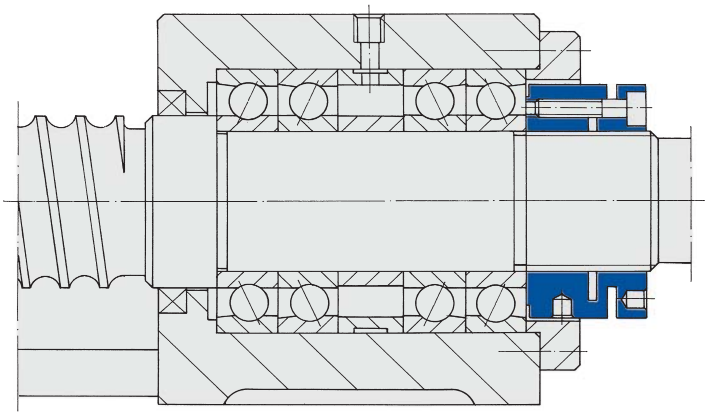
Spieth benefit: The previously set locking forces are not cancelled by the working load, but are superimposed and therefore reinforced. Put simply: the forces act in the same direction and are therefore added to each other. The optimum solution that delivers improved safety.

ASSEMBLY EXAMPLES



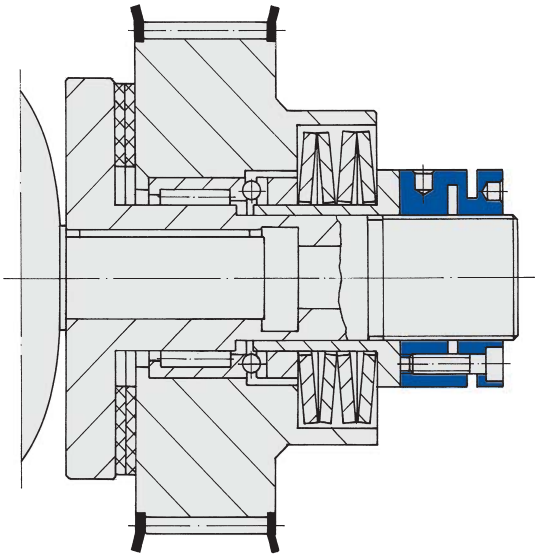
Example 1: Tapered roller bearing

In tapered roller bearings, run-out accuracy, a high level of axial rigidity and dynamic safety create a major contribution to perfect bearing operation: Radial stress applied to the tapered roller bearing generates axial forces (axial rigidity). Due to a lack of axial pretension (no axial friction), the intrinsic safety of the locknut is extremely important.



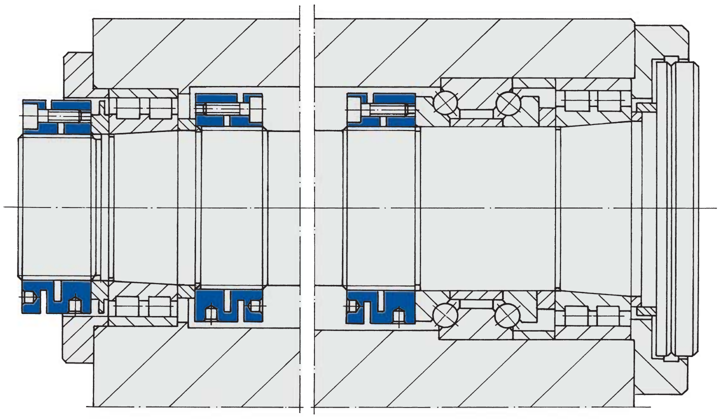
Example 2: Ball roller spindle

The use of a locknut gives the bearing of the ball roller spindle a high degree of axial rigidity. Under highly dynamic operating conditions, the high degree of dynamic safety of the locknut represents a major advantage.



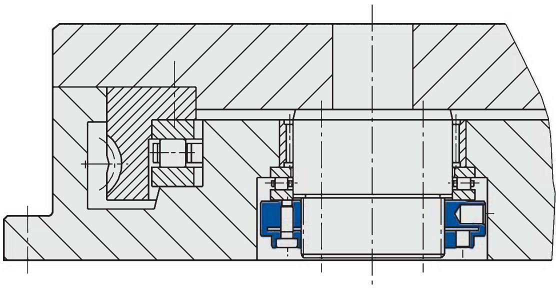
Example 3: Friction clutch

A locknut is used here to provide precise and infinitely variable adjustment of the pretension of the spring on a friction clutch. The reliable locking function is of particular impor-



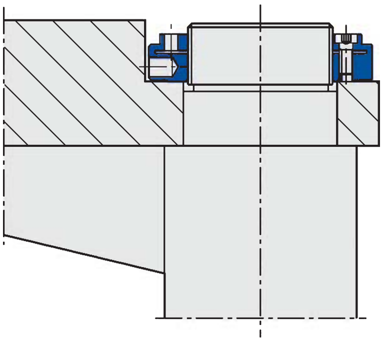
Example 4: Main spindle bearing

The locknut ensures a high level of axial rigidity and excellent concentricity on the main spindle bearing in a turning lathe.



Example 5: Round axis

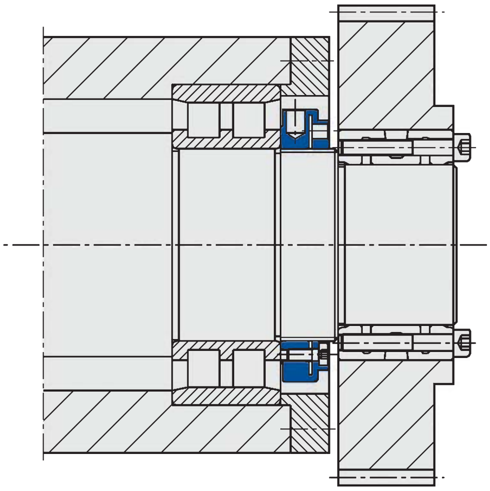
Not a millimetre is lost in the axial direction and, despite this, there is no need to sacrifice run-out accuracy, axial rigidity or a high degree of dynamic safety.



Example 6: Table structure

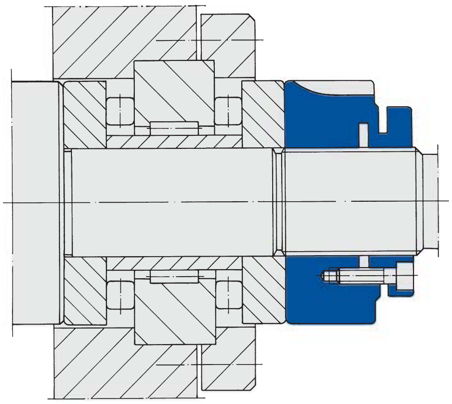
Due to the flat design, countersunk installation is possible without causing any interfering contours in the table surface. Straining of the structure due to a tilting locknut caused by thread flank play, or even opening under dynamic load are not possible due to the characteristic properties of the locknut.

ASSEMBLY EXAMPLES



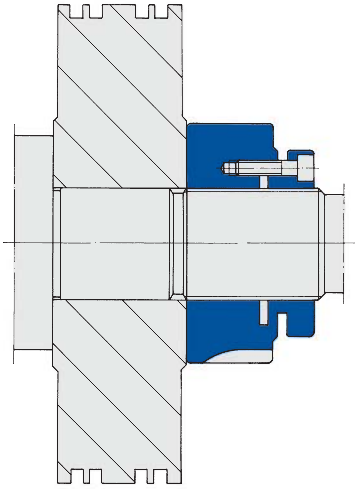
Example 7: Tooling spindle

The low installation height of the MSF locknut makes it possible to create a compact drive side of the spindle. This configuration saves valuable installation space and minimises destructive rotating bending stress. At the same time, the benefits of a Spieth high-precision locknut are fully exploited.



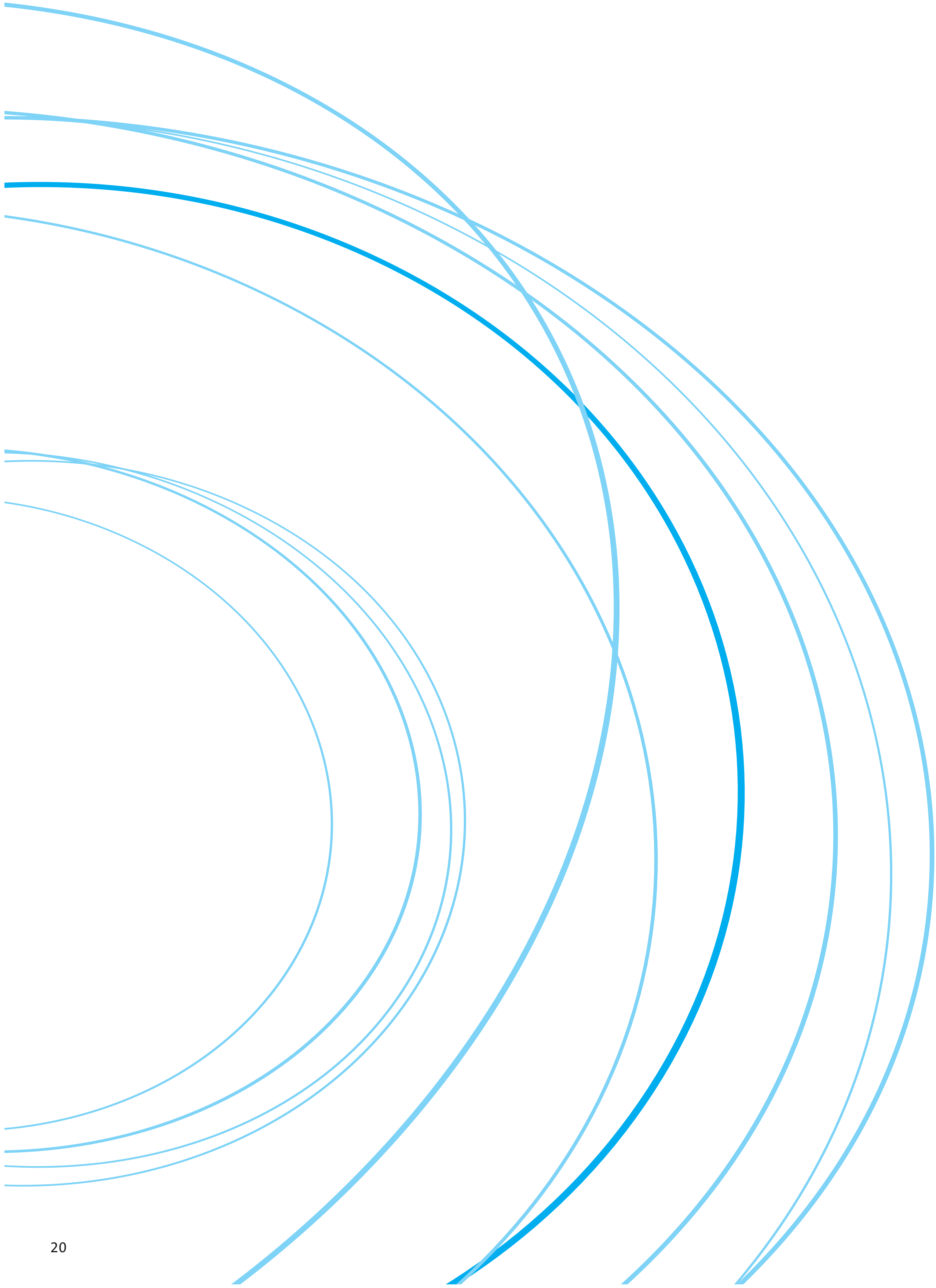
Example 8: Feed drive system

The installation using a locknut reliably transmits the high load-bearing capacity and axial rigidity of the needle axial cylindrical bearing to the feed drive system. The excellent locking properties provided by the locknut are of major importance under dynamic stress.



Example 9: Piston fixture

The piston fixture utilizes all the technical benefits of locknuts: Load-bearing capacity, axial rigidity and excellent locking properties.



SPIETH **LOCKNUTS: THE RIGHT CHOICE**

We'll provide you with the perfect locknuts for your application. We'll also help you choose the right one – with expert advice from our specialists.

Series MSR – MSA, MSF and MSW

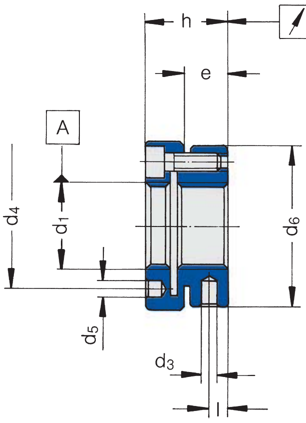
- Excellent axial rigidity and loading capacity under high levels of dynamic stress.
- Simple connecting components, no grooves, locking plates etc.
- Axial position of the contact surface can be easily and precisely adjusted.
- Even in the installed state, exact run-out accuracy, which can be further improved with adjustment.

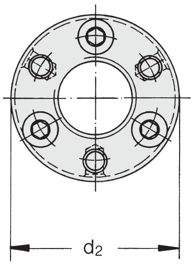
LOCKNUTS
Precision nuts with high-performance locking system

Working load and rigidity requirements

Design	Normal	High	Design
Standard	 **Series MSR**	 **Series MSW**	Heavy-duty
Reduced contact surface and in some cases with reduced outer diameter	 **Series MSA**	 **Series MSW**	Heavy-duty > M70
Low installation height	 **Series MSF**		

SPIETH LOCKNUTS SERIES **MSR**

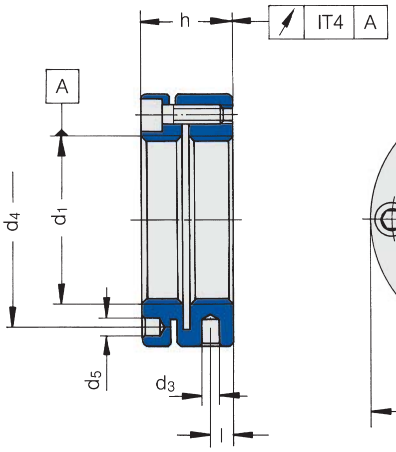


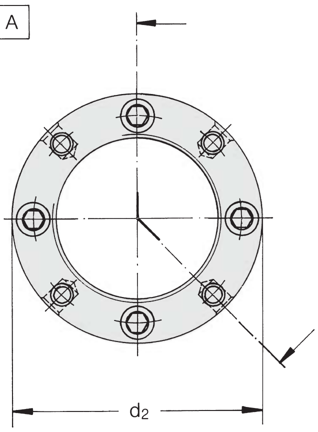


The admissible operating loads specified in the table are guideline values calculated with a safety factor of 1.6

- under static stress relative to the minimum yield point,
- under dynamic stress relative to the minimum alternate strength.

Order No.	Dimensions in mm									Clamping screws			Calculation factor A	Calculation factor B	Perm. axial stress		Moment of inertia J
	d_1	d_2	d_3 1)	d_4	d_5 1)	d_6	h	l	e	ISO 4762	M_A	No.			dyn.	stat.	
	ISO-5H	h11	H11		H11	h11					Nm		mm	N	kN	kN	kg cm^2
MSR 10.0,75	M10x0.75	24	2.5	17	3.2	22	14	3	6.5	M3	2	3	0.672	2457	12	16	0.025
MSR 10.1	M10x1	24	2.5	17	3.2	22	15	3	6.5	M3	2	3	0.703	2457	12	15	0.027
MSR 12.1	M12x1	26	3	19	3.2	25	14	3	6.5	M3	2	3	0.819	2438	14	19	0.037
MSR 12.1,5	M12x1.5	26	3	19	3.2	25	15	3	6.5	M3	2	3	0.881	2438	13	18	0.040
MSR 14.1,5	M14x1.5	32	4	22.5	4.3	30	16	3	7	M4	2.9	3	0.997	2995	17	22	0.096
MSR 15.1	M15x1	33	4	23.5	4.3	31	16	3	7	M4	2.9	3	0.992	2984	19	25	0.108



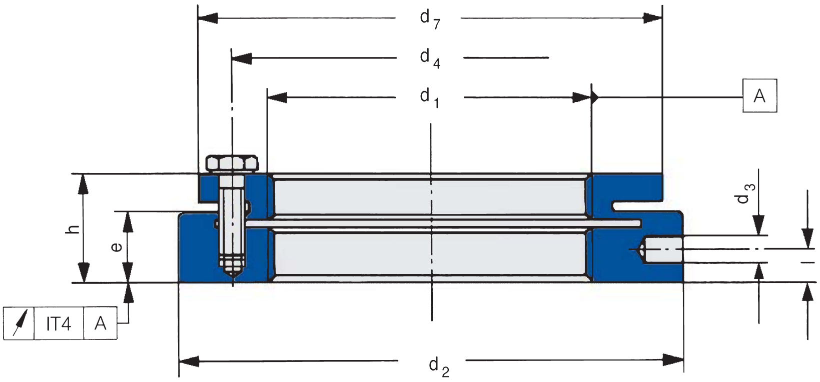


Order No.	Dimensions in mm							Clamping screws			Calculation factor A	Calculation factor B	Perm. axial stress		Moment of inertia J
	d_1	d_2	d_3 1)	d_4	d_5 1)	h	l	ISO 4762	M_A	No.			dyn.	stat.	
	ISO-5H	h11	H11		H11				Nm		mm	N	kN	kN	kg cm^2
MSR 16.1,5	M16x1.5	34	4	24.5	4.3	18	5	M4	2.9	4	1.112	3962	17	22	0.147
MSR 17.1	M17x1	35	4	25.5	4.3	18	5	M4	2.9	4	1.108	3947	19	25	0.164
MSR 18.1,5	M18x1.5	36	4	26.5	4.3	18	5	M4	2.9	4	1.228	3931	19	25	0.183
MSR 20.1	M20x1	40	4	30.5	4.3	18	5	M4	2.9	4	1.281	3900	22	29	0.283
MSR 20.1,5	M20x1.5	40	4	30.5	4.3	18	5	M4	2.9	4	1.344	3900	18	28	0.283
MSR 22.1,5	M22x1.5	40	4	30.5	4.3	18	5	M4	2.9	4	1.459	3869	23	32	0.270
MSR 24.1,5	M24x1.5	42	4	32.5	4.3	18	5	M4	2.9	4	1.575	3838	25	35	0.323
MSR 25.1,5	M25x1.5	45	5	36.5	4.3	20	6.5	M4	2.9	4	1.633	3822	33	47	0.488
MSR 26.1,5	M26x1.5	45	5	36.5	4.3	20	6.5	M4	2.9	4	1.690	3806	34	49	0.479
MSR 28.1,5	M28x1.5	46	5	38.5	4.3	20	6.5	M4	2.9	4	1.805	3775	36	53	0.504

Order No.	Dimensions in mm							Clamping screws			Calculation factor A	Calculation factor B	Perm. axial stress		Moment of inertia J
	d_1	d_2	d_3 [1]	d_4	d_5 [1]	h	l	ISO 4762	M_A	No.			dyn.	stat.	
	ISO-5H	h11	H11		H11				Nm		mm	N	kN	kN	kg cm^2
MSR 30.1,5	M30x1.5	48	5	40.5	4.3	20	6.5	M4	2.9	4	1.921	3744	38	57	0.588
MSR 32.1,5	M32x1.5	50	5	42.5	4.3	22	7	M4	2.9	4	2.037	3713	44	64	0.743
MSR 35.1,5	M35x1.5	53	5	45.5	4.3	22	7	M4	2.9	4	2.210	3666	47	66	0.914
MSR 38.1,5	M38x1.5	58	5	48.5	4.3	22	7	M4	2.9	4	2.449	3619	50	75	1.340
MSR 40.1,5	M40x1.5	58	5	50.5	4.3	22	7	M4	2.9	4	2.500	3588	49	66	1.250
MSR 42.1,5	M42x1.5	60	5	52.5	4.3	22	7	M4	2.9	4	2.617	3557	49	66	1.410
MSR 45.1,5	M45x1.5	68	6	58	4.3	22	6.5	M4	2.9	6	2.789	5265	53	84	2.490
MSR 48.1,5	M48x1.5	68	6	59.5	4.3	25	9	M4	2.9	6	2.962	5195	70	94	2.630
MSR 50.1,5	M50x1.5	70	6	61.5	4.3	25	9	M4	2.9	6	3.079	5148	71	94	2.910
MSR 52.1,5	M52x1.5	72	6	63.5	4.3	25	9	M4	2.9	6	3.196	5101	72	96	3.210
MSR 55.1,5	M55x1.5	75	6	66.5	4.3	25	9	M4	2.9	6	3.369	5031	72	96	3.690
MSR 55.2	M55x2	75	6	66.5	4.3	25	9	M4	2.9	6	3.430	5031	78	96	3.690
MSR 58.1,5	M58x1.5	82	6	72.5	5.3	26	9	M5	6	6	3.541	8077	103	161	5.810
MSR 60.1,5	M60x1.5	84	6	74.5	5.3	26	9	M5	6	6	3.655	8001	105	163	6.320
MSR 60.2	M60x2	84	6	74.5	5.3	26	9	M5	6	6	3.718	8001	104	163	6.320
MSR 62.1,5	M62x1.5	86	6	76.5	5.3	28	10.5	M5	6	6	3.774	7925	123	186	7.330
MSR 65.1,5	M65x1.5	88	6	78.5	5.3	28	10.5	M5	6	6	3.948	7811	129	177	7.710
MSR 65.2	M65x2	88	6	78.5	5.3	28	10.5	M5	6	6	4.007	7811	127	177	7.710
MSR 68.1,5	M68x1.5	95	8	83	5.3	28	9.5	M5	6	6	4.121	7696	133	223	11.000
MSR 70.1,5	M70x1.5	95	8	85	5.3	28	9.5	M5	6	6	4.238	7620	136	203	10.500
MSR 70.2	M70x2	95	8	85	5.3	28	9.5	M5	6	6	4.297	7620	134	203	10.500
MSR 72.1,5	M72x1.5	98	8	86	6.4	28	8.5	M6	10	6	4.354	10692	124	170	11.800
MSR 75.1,5	M75x1.5	100	8	88	6.4	28	8.5	M6	10	6	4.525	10530	121	160	12.300
MSR 75.2	M75x2	100	8	88	6.4	28	8.5	M6	10	6	4.583	10530	126	160	12.300
MSR 80.2	M80x2	110	8	95	6.4	32	11	M6	10	6	4.873	10260	162	258	22.000
MSR 85.2	M85x2	115	8	100	6.4	32	11	M6	10	6	5.168	9990	170	262	25.700
MSR 90.2	M90x2	120	8	108	6.4	32	11	M6	10	6	5.453	9720	178	265	29.600
MSR 95.2	M95x2	125	8	113	6.4	32	11	M6	10	6	5.744	9450	185	268	34.000
MSR 100.2	M100x2	130	8	118	6.4	32	11	M6	10	6	6.033	9180	193	271	38.800
MSR 105.2	M105x2	135	8	123	6.4	32	11	M6	10	6	6.321	8910	203	274	44.100
MSR 110.2	M110x2	140	8	128	6.4	32	11	M6	10	6	6.616	8640	212	280	49.800
MSR 115.2	M115x2	145	8	133	6.4	36	13	M6	10	6	6.900	8370	248	329	64.200
MSR 120.2	M120x2	155	8	140	6.4	36	13	M6	10	6	7.193	8100	272	408	89.700
MSR 125.2	M125x2	160	8	148	6.4	36	13	M6	10	6	7.474	7830	281	412	99.700
MSR 130.3	M130x3	165	8	153	6.4	36	13	M6	10	6	7.895	7560	285	405	111.000
MSR 140.3	M140x3	180	10	165	6.4	36	12	M6	10	8	8.475	9360	302	476	161.000
MSR 150.3	M150x3	190	10	175	6.4	36	12	M6	10	8	9.050	8640	325	489	193.000
MSR 160.3	M160x3	205	10	185	8.4	40	14	M8	25	8	9.633	14520	377	552	301.000
MSR 170.3	M170x3	215	10	195	8.4	40	14	M8	25	8	10.213	13200	399	560	353.000
MSR 180.3	M180x3	230	10	210	8.4	40	14	M8	25	8	10.789	11880	420	648	478.000
MSR 190.3	M190x3	240	10	224	8.4	40	14	M8	25	8	11.362	10560	444	656	550.000
MSR 200.3	M200x3	245	10	229	8.4	40	14	M8	25	8	11.948	9240	467	578	545.000

[1] The number of holes corresponds to the number of clamping screws.

SPIETH LOCKNUTS SERIES **MSR**

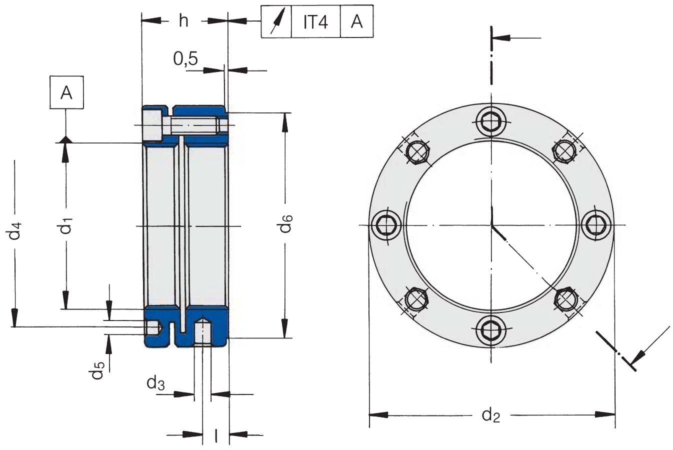


Order No.	Dimensions in mm									Clamping screws			Calculation factor	Calculation factor	Perm. axial stress	Moment of inertia
	d_1	d_2	d_3 [1]	d_4	d_7	h	l	e	ISO 4017	ISO 4014	M_A	No.	A	B	stat.	J
	ISO-5H	h11	H11		h11						Nm		mm	N	kN	kg cm²
MSR 210.3	M210×3	270	12	232	250	44	13	27	M8		25	8	12.515	5280	598	926
MSR 220.3	M220×3	282	12	242	260	44	13	27	M8		25	8	13.097	5148	626	1090
MSR 230.3	M230×3	295	12	252	270	44	13	27	M8		25	8	13.677	5016	664	1280
MSR 240.3	M240×3	308	12	262	280	44	13	27	M8		25	8	14.256	4884	703	1510
MSR 250.3	M250×3	322	12	272	290	44	13	27	M8		25	8	14.833	4752	752	1790
MSR 260.3	M260×3	336	12	282	300	44	13	27	M8		25	10	15.408	5775	800	2100
MSR 270.3	M270×3	350	12	292	310	44	13	27	M8		25	10	15.982	5610	849	2460
MSR 280.3	M280×3	364	12	302	320	44	13	27	M8		25	10	16.578	5445	897	2870
MSR 290.3	M290×3	376	12	312	330	44	13	27	M8		25	10	17.149	5280	925	3230
MSR 300.3	M300×3	390	12	322	340	44	13	27	M8		25	10	17.717	5115	973	3730
MSR 310.4	M310×4	400	14	337	360	54	16	32		M10	49	10	18.437	7860	1098	5290
MSR 320.4	M320×4	412	14	347	370	54	16	32		M10	49	10	19.008	7598	1130	5900
MSR 330.4	M330×4	424	14	357	380	54	16	32		M10	49	10	19.578	7336	1163	6560
MSR 340.4	M340×4	436	14	367	390	54	16	32		M10	49	10	20.176	7074	1194	7270
MSR 350.4	M350×4	450	14	377	400	54	16	32		M10	49	10	20.743	6812	1253	8220
MSR 360.4	M360×4	466	14	387	410	54	16	32		M10	49	12	21.309	7860	1333	9460
MSR 370.4	M370×4	478	14	397	420	54	16	32		M10	49	12	21.905	7546	1366	10400
MSR 380.4	M380×4	490	14	407	430	54	16	32		M10	49	12	22.468	7231	1399	11400

[1] The number of holes corresponds to the number of clamping screws.

The admissible operating loads specified in the table are guideline values calculated with a safety factor of 1.6 under static stress relative to the minimum yield point.

SPIETH LOCKNUTS SERIES **MSA**



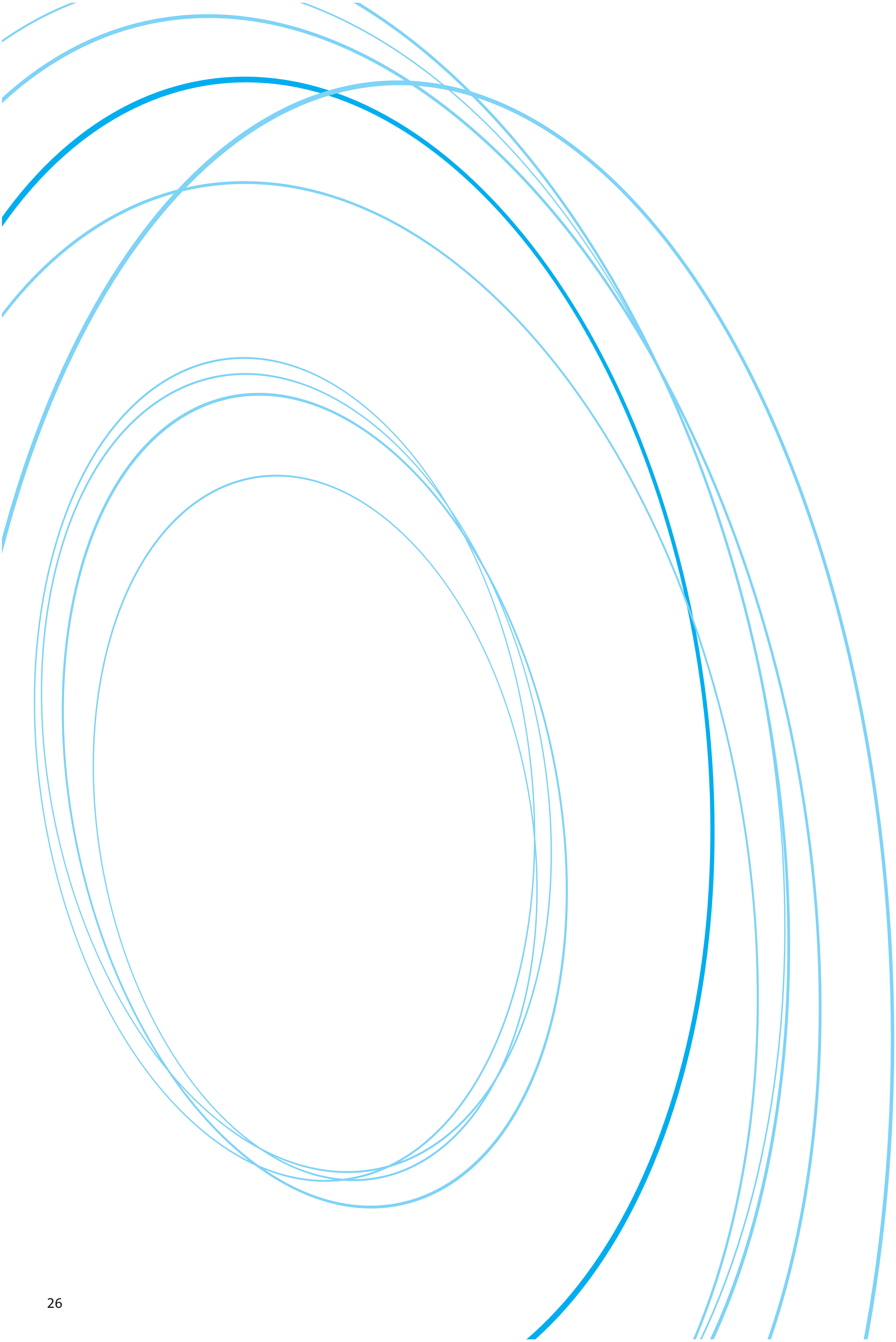
Order No.	Dimensions in mm								Clamping screws			Calculation factor A	Calculation factor B	Perm. axial stress		Moment of inertia J
	d_1	d_2	d_3 [1]	d_4	d_5 [1]	d_6	h	l	ISO 4762	M_A	No.			dyn.	stat.	
	ISO-5H	h11	H11		H11					Nm		mm	N	kN	kN	kg cm²
MSA 20.1	M20x1	35	4	27.5	3.2	31	17	5	M3	2	5	1.281	3938	23	31	0.142
MSA 25.1,5	M25x1.5	40	4	32.5	3.2	36	19	6.5	M3	2	5	1.633	3859	35	49	0.265
MSA 30.1,5	M30x1.5	45	5	37.5	3.2	41	19	6.5	M3	2	5	1.921	3780	39	56	0.400
MSA 35.1,5	M35x1.5	53	5	45.5	4.3	48	22	7	M4	2.9	4	2.210	3666	47	66	0.904
MSA 40.1,5	M40x1.5	58	5	50.5	4.3	54	22	7	M4	2.9	4	2.500	3588	50	68	1.240
MSA 45.1,5	M45x1.5	64	6	54	4.3	59	23	7	M4	2.9	5	2.789	4388	58	78	1.890
MSA 50.1,5	M50x1.5	69	6	59	4.3	64	24	8	M4	2.9	6	3.079	5148	63	85	2.560
MSA 55.1,5	M55x1.5	73	6	64	4.3	69	24	8	M4	2.9	6	3.369	5031	59	79	3.000
MSA 60.1,5	M60x1.5	78	6	69	4.3	74	24	8	M4	2.9	6	3.655	4914	61	81	3.760
MSA 65.1,5	M65x1.5	83	6	74	4.3	79	24	8	M4	2.9	7	3.948	5597	94	124	4.610
MSA 70.1,5	M70x1.5	93	8	83	5.3	88	27	9	M5	6	6	4.238	7620	136	178	9.090
MSA 75.1,5	M75x1.5	98	8	88	5.3	93	27	9	M5	6	6	4.525	7430	138	183	10.900
MSA 80.2	M80x2	103	8	93	5.3	98	28	10	M5	6	6	4.873	7239	148	196	13.400
MSA 85.2	M85x2	112	8	100	6.4	106	30	10	M6	10	6	5.168	9990	172	228	21.300
MSA 90.2	M90x2	117	8	105	6.4	111	30	10	M6	10	6	5.453	9720	174	230	24.700
MSA 95.2	M95x2	122	8	110	6.4	116	30	10	M6	10	6	5.744	9450	176	232	28.400
MSA 100.2	M100x2	130	8	118	6.4	123	32	11	M6	10	6	6.033	9180	205	271	38.600
MSA 105.2	M105x2	135	8	123	6.4	128	32	11	M6	10	6	6.321	8910	207	274	43.900
MSA 110.2	M110x2	140	8	128	6.4	133	32	11	M6	10	6	6.616	8640	212	280	49.500
MSA 120.2	M120x2	155	8	140	6.4	145	36	13	M6	10	6	7.193	8100	308	408	89.100
MSA 130.3	M130x3	165	8	153	6.4	155	36	13	M6	10	6	7.895	7560	306	405	110.000
MSA 140.3	M140x3	180	10	165	6.4	170	36	12	M6	10	8	8.475	9360	359	476	160.000
MSA 150.3	M150x3	190	10	175	6.4	180	36	12	M6	10	8	9.050	8640	369	489	192.000
MSA 160.3	M160x3	205	10	185	8.4	195	40	14	M8	25	8	9.633	14520	417	552	300.000
MSA 170.3	M170x3	215	10	195	8.4	205	40	14	M8	25	8	10.213	13200	423	560	352.000
MSA 180.3	M180x3	230	10	210	8.4	220	40	14	M8	25	8	10.789	11880	489	648	476.000
MSA 190.3	M190x3	240	10	224	8.4	230	40	14	M8	25	8	11.362	10560	495	656	548.000
MSA 200.3	M200x3	245	10	229	8.4	235	40	14	M8	25	8	11.948	9240	436	578	543.000

[1] The number of holes corresponds to the number of clamping screws.

The MSA series 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.

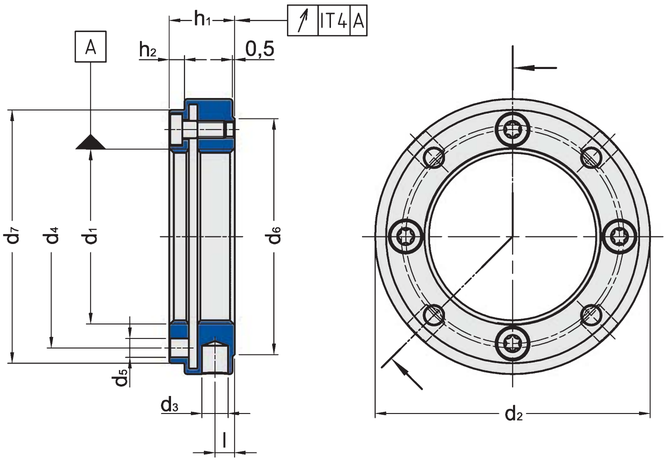
The admissible operating loads specified in the table are guideline values calculated with a safety factor of 1.6

- under static stress relative to the minimum yield point,
- under dynamic stress relative to the minimum alternate strength.



SPIETH LOCKNUTS SERIES **MSF**

For applications with limited installation space.

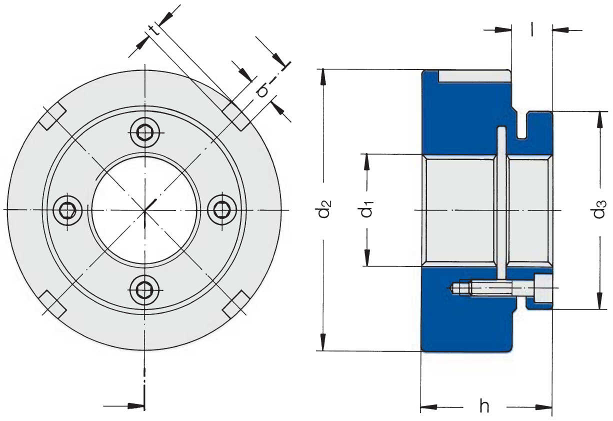


Order No.	Dimensions in mm										Clamping screws cheese head clamping screws			Calculation factor	Perm. axial stress	Moment of inertia J
	d_1	d_2	d_3 [1]	d_4	d_5 [1]	d_6	d_7	h_1	h_2	l	✱	M_A	No.	A	Stat. Fa	
	ISO-5H	h11	H11		H11		h11				Size	Nm		mm	kN	kg cm²
MSF 25.1,5	M25x1.5	48	5	36	4.3	39	43	14	3.5	4	20	2.9	4	1.633	26	0.338
MSF 30.1,5	M30x1.5	53	5	41	4.3	44	48	15	3.5	4.5	20	2.9	4	1.921	40	0.624
MSF 35.1,5	M35x1.5	58	5	46	4.3	49	53	15	3.5	4.5	20	2.9	4	2.210	49	0.876
MSF 40.1,5	M40x1.5	63	6	51	4.3	54	58	15	3.5	4.5	20	2.9	4	2.500	57	1.190
MSF 45.1,5	M45x1.5	70	6	56	4.3	59	63	15	3.5	4.5	20	2.9	6	2.789	60	1.700
MSF 50.1,5	M50x1.5	75	6	61	4.3	64	68	16	3.5	5	20	2.9	6	3.079	80	2.390
MSF 55.1,5	M55x1.5	80	6	66	4.3	69	73	16	3.5	5	20	2.9	6	3.369	120	3.020
MSF 55.2	M55x2	80	6	66	4.3	69	73	16	3.5	5	20	2.9	6	3.430	116	3.020
MSF 60.1,5	M60x1.5	89	6	74	5.3	77	82	18	5	5.25	25	6	6	3.655	131	5.340
MSF 60.2	M60x2	89	6	74	5.3	77	82	18	5	5.25	25	6	6	3.719	126	5.340
MSF 65.1,5	M65x1.5	94	8	79	5.3	82	87	18	5	5.25	25	6	6	3.948	144	6.510
MSF 65.2	M65x2	94	8	79	5.3	82	87	18	5	5.25	25	6	6	4.008	139	6.510
MSF 70.1,5	M70x1.5	99	8	84	5.3	87	92	18	5	5.25	25	6	6	4.238	155	7.550
MSF 70.2	M70x2	99	8	84	5.3	87	92	18	5	5.25	25	6	6	4.297	150	7.550
MSF 75.1,5	M75x1.5	106	8	89	6.4	94	99	20	6	5.75	30	10	6	4.525	178	11.200
MSF 75.2	M75x2	106	8	89	6.4	94	99	20	6	5.75	30	10	6	4.587	172	11.200
MSF 80.2	M80x2	111	8	94	6.4	99	104	20	6	5.75	30	10	6	4.873	186	13.400
MSF 90.2	M90x2	121	8	104	6.4	109	114	20	6	5.75	30	10	6	5.453	214	18.100
MSF 100.2	M100x2	131	8	114	6.4	119	124	20	6	5.75	30	10	6	6.033	242	24.000

[1] The number of holes corresponds to the number of clamping screws.

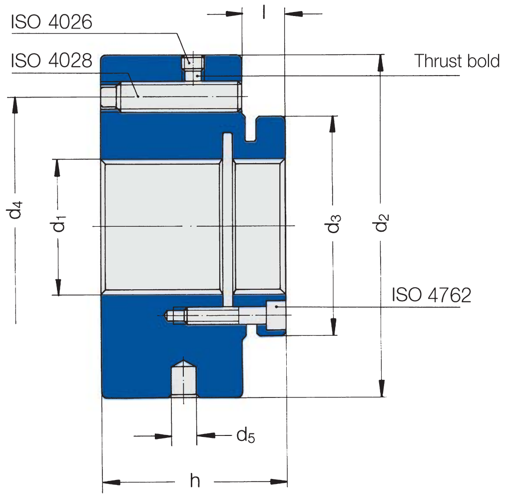
The admissible operating loads specified in the table are guideline values calculated with a safety factor of 1.6 under static stress relative to the minimum yield point.

SPIETH LOCKNUTS SERIES **MSW**



Order No.	Dimensions in mm							Clamping screws			Calculation factor A	Locknut-specific allowance B	Perm. axial stress		Moment of inertia J
	d_1	d_2	d_3	h	l	b[1]	t	ISO 4762	M_A	No.			dyn.	stat.	
	ISO-5H	c11							Nm		mm	N	kN	kN	kg cm^2
MSW 20.28	M20x1.5	42	38	28	11	6	2.5	M4	2.9	4	1.344	1560	57	80	0.486
MSW 20.40	M20x1.5	52	42	40	11	7	3	M4	2.9	4	1.344	936	110	156	1.740
MSW 25.28	M25x1.5	47	43	28	11	7	3	M4	2.9	4	1.633	1560	68	102	0.742
MSW 25.40	M25x1.5	62	47	40	11	8	3.5	M4	2.9	4	1.633	936	131	196	3.410
MSW 30.28	M30x1.5	52	48	28	11	7	3	M4	2.9	4	1.921	1560	77	123	1.090
MSW 30.44	M30x1.5	68	52	44	11	8	3.5	M4	2.9	4	1.921	936	172	273	5.540
MSW 35.28	M35x1.5	60	53	28	11	8	3.5	M4	2.9	4	2.210	1560	88	144	1.800
MSW 35.44	M35x1.5	73	60	44	11	8	3.5	M4	2.9	4	2.210	936	195	320	7.410
MSW 40.28	M40x1.5	65	58	28	11	8	3.5	M4	2.9	6	2.500	1560	97	165	2.430
MSW 40.44	M40x1.5	75	62	44	11	8	3.5	M4	2.9	6	2.500	936	215	367	7.980
MSW 45.28	M45x1.5	70	63	28	11	8	3.5	M4	2.9	6	2.789	2340	105	184	3.140
MSW 45.44	M45x1.5	90	70	44	11	10	4	M4	2.9	6	2.789	1404	234	410	16.400
MSW 50.32	M50x1.5	75	68	32	11	8	3.5	M4	2.9	6	3.079	2340	147	267	4.780
MSW 50.46	M50x1.5	95	75	46	11	10	4	M4	2.9	6	3.079	1404	268	488	21.300
MSW 55.46	M55x1.5	100	80	46	12	10	4	M5	6	6	3.369	2286	272	504	23.600
MSW 60.46	M60x1.5	100	85	46	12	10	4	M5	6	6	3.655	2286	294	551	24.800
MSW 65.46	M65x1.5	110	90	46	12	10	4	M5	6	6	3.948	2286	314	598	35.900
MSW 70.46	M70x1.5	115	95	46	12	10	4	M5	6	6	4.238	2286	333	645	42.200

[1] The number of grooves for hook spanner DIN 1810-A corresponds to the number of clamping screws.



Order No.	Dimensions in mm								Clamping screws			Perm. axial stress	
	d_1	d_2	d_3	h	l	d_4	d_5		ISO 4762	M_A	No.	dyn.	stat.
	ISO - 5H	c11					ø H11	No.		Nm		kN	kN
MSW 72.60	M72x1.5	135	95	60	14	105	8	4	M5	6	6	468	749
MSW 85.60	M85x2	160	110	60	14	124	8	4	M6	10	6	807	1050
MSW 105.66	M105x2	190	136	66	15	150	10	4	M6	10	6		1100
MSW 125.72	M125x2	215	154	72	16	172	10	4	M6	10	6		1600
MSW 140.78	M140x3	240	176	78	17	196	10	4	M6	10	8		2000

Order No.	Set screws					Lock screws		Alu thrust bolt		
	ISO 4028 - 45H	d_6	M_D [2]	No.	Calculation factor A	ISO 4026	No.	ø	Length	No.
		mm	Nm		mm			mm	mm	
MSW 72.60	M10x45	7	34	8	0.92064	M6x8	8	4.5	3	8
MSW 85.60	M12x45	8.5	60	8	1.09913	M8x8	8	6	3	8
MSW 105.66	M12x50	8.5	60	9	1.09913	M8x8	9	6	4	9
MSW 125.72	M16x55	12	140	9	1.42613	M8x8	9	6	4	9
MSW 140.78	M16x60	12	140	9	1.42613	M8x8	9	6	4	9

[2] Manufacturer's max. permissible tightening torque.

The admissible operating loads specified in the table are guideline values calculated with a safety factor of 1.6

- under static stress relative to the minimum yield point,
- under dynamic stress relative to the minimum alternate strength.

The locknut is deformable in the axial direction and must therefore be handled with care. The clamping screws should only be tightened when the locknut has been screwed completely onto the spindle thread. If these instructions are ignored, inadmissible plastic deformation could render the locknut unusable.

Assembly

1. Carefully clean the locknut and connecting components and wet slightly with low-viscosity machine oil that does not contain friction-reducing additives.
2. Screw the locknut onto the spindle thread, but without making contact with the end face (Fig. 1).
3. Tighten the clamping screws evenly in diagonal sequence while turning the locknut forwards and backwards. Stop tightening when flank play is almost eliminated (Fig. 2).
4. Now tighten the locknut against the end contact surface initially by exerting a higher level of preliminary torque. Then release again and finally tighten using the prescribed degree of torque (Fig. 3). This sequence prevents subsequent seizure at the contact surfaces (thread flanks, end contact surfaces).
5. Then secure the locknut by evenly tightening the clamping screws. In applications that impose strict requirements in terms of spindle concentricity, it is possible to adjust the concentricity after testing by tightening the clamping screws individually. This eliminates any unilateral tensions caused by minimal axial run-out errors in the connecting components.

Dismantling

First slightly relieve the tension of the clamping screws in diagonal sequence. Only then should the clamping screws be fully released. This prevents all of the tension of the diaphragm from acting on the last clamping screw to be released and causing it to jam.

Once a locknut has been secured on a spindle thread, after removal it may only be used again on the same spindle. Adjustments carried out between the spindle and locknut can otherwise lead to problems if the locknut is used on a different spindle.

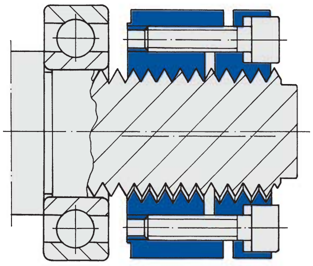


Fig. 1

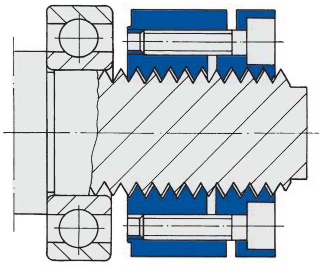


Fig. 2

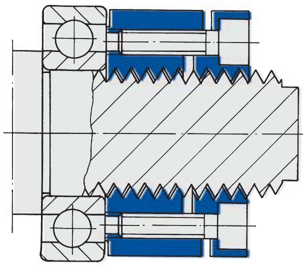


Fig. 3

Assembly

1. Carefully clean the locknut and connecting components and wet slightly with low-viscosity machine oil that does not contain friction-reducing additives.
2. Screw the locknut onto the spindle thread, but without making contact with the end face. The set screws should not protrude from the end face. (Fig. 4).
3. Tighten the clamping screws evenly in diagonal sequence while turning the locknut forwards and backwards. Stop tightening when flank play is almost eliminated (Fig. 5).
4. Now screw the locknut until it makes contact with the end face. Then tighten the clamping screws evenly to fix the lock.
5. Then tighten the set screws against the contact surface step by step in the sequence shown at a higher level of preliminary torque. Loosen them again and finally tighten them using the prescribed preliminary torque (Fig. 6). This sequence prevents subsequent seizure at the contact surfaces (thread flanks, end contact surfaces).
6. Finally tighten the lock screws and check the clamping screws again for the prescribed preliminary torque and adjust if necessary.

Dismantling

1. Release the lock screws, then slightly loosen the set screws in the sequence shown before fully releasing them.
2. First slightly relieve the tension of the clamping screws in diagonal sequence. Only then should the clamping screws be fully released. This prevents all of the tension of the diaphragm from acting on the last clamping screw to be released and causing it to jam.

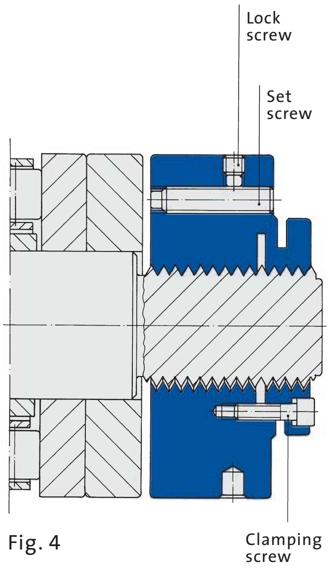


Fig. 4

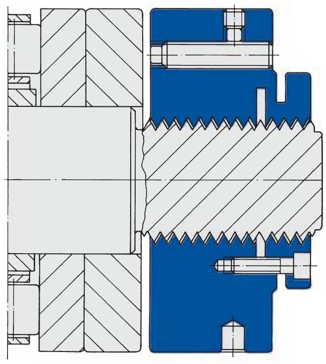


Fig. 5

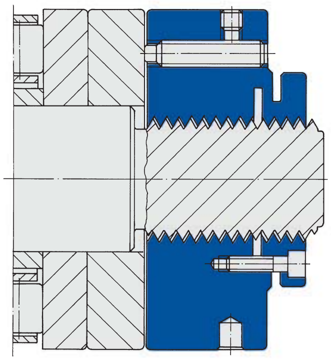


Fig. 6

GENERAL DESIGN

The locknuts are made of burnished steel. The metric ISO thread is manufactured to tolerance class "fine" (tolerance zone 5H, DIN 13 parts 21 ... 25) in a single work process with the end face of the locknut. All locknuts are fitted with integrated clamping screws to lock the thread. Radial installation is carried out with the aid of a hook spanner DIN 1810 shape A or shape B.

MSW DESIGN

These locknuts are generally required to withstand high pretension forces. In the upper dimension range, these pretension forces can no longer be achieved in practice using the locknut's own pretension moment due to the size of the friction radii. For this reason, the MSW locknut series is divided into 2 different versions: Up to locknut size MSW 70.46, axial pretension is set by using the preliminary torque of the locknut. From size MSW 72.60 upwards, this is done using the tightening torque of the integrated set screws.

CLAMPING SCREWS

Cheese-head screws with a hexagon socket ISO 4762 (DIN 912) or hexalobular socket cheese head screws (similar to TORX) with strength class 12.9, as well as hexagon bolts ISO 4014 and ISO 4017 with strength class 10.9 are used.

M_A: Tightening torque per clamping screw
The tightening torque is based on a friction coefficient of $\mu = 0.14$. As the effective friction coefficients depend on a range of factors which are often beyond the control of the manufacturer, the values specified here should only be regarded as non-binding recommendations.

CONNECTING COMPONENTS

The metric bolt thread must normally be manufactured to tolerance class "medium" (tolerance zone 6g, DIN 13 parts 21 ... 25), for higher precision requirements, to tolerance class "fine" (tolerance zone 4h, DIN 13 parts 21 ... 25).

The contact surfaces of the connecting components are essential to optimum functioning and must be manufactured with particular care and precision. To avoid surface seizure, all contact surfaces should be finished with a low level of surface roughness.

CONNECTING COMPONENTS MSW > M70

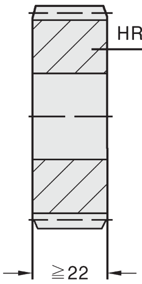


Fig. 1

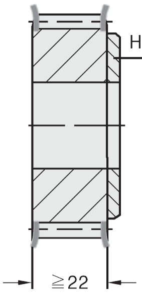


Fig. 2

For this locknut size, the axial pretension applied by the hardened threaded pins requires a specially configured thrust collar to absorb the extremely high local pressure loads. This thrust ring must be hardened. The reason for the prescribed minimum height is to ensure distribution of locally occurring pressure forces to the following end contact surface. In certain cases, an already existing machine component, such as a gear, may be able to assume the function of the thrust collar (Fig. 1+2).

SETTING THE AXIAL PRETENSIONING FORCES

The axial pretension of a screw connection often plays a decisive role for successful function, and must therefore be set with particular accuracy. However, in most assembly workshops, direct measurement of this variable is not possible, raising the need for indirect methods of setting. For this purpose, the locknut preliminary torque corresponding to the required pre-tensioning force is calculated. This factor can be determined using the following equation:

The locking process places the spindle thread under stress and in this case brings about intensive surface contact (= high axial rigidity). At the same time, this serves to relieve tension on the end contact surface of the locknut. This effect can easily be compensated by increasing preliminary torque accordingly during installation. This higher preliminary torque is ascertained using the allowance B relative to the required pre-tensioning force F_V.

General

$$M_V = \frac{(F_V + B) \cdot (A + \mu_A \cdot r_A)}{1000} \text{ [Nm]}$$

M_V = Pre-tensioning torque of the locknut [Nm]

F_V = Required axial pretension force of the threaded 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 width (catalogue value)

μ_A = Frictional coefficient for the end contact surface of the locknut Approximate value $\mu_A = 0.1$ steel/steel

r_A = Effective friction radius for the end contact face of the locknut [mm]

From locknut size MSW > M70

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

$$M_D = \frac{F_V \cdot (4 \cdot A + \mu_D \cdot d_6)}{n \cdot 4000} \text{ [Nm]}$$

M_D = Tightening torque per set screw [Nm]

F_V = Required axial pretension force of the threaded connection [N]

A = Constant [mm], includes the Calculation factors for the respective thread width (catalogue value)

μ_D = Frictional coefficient for the end contact face of the set screw Approximate value = 0.13

d_6 = Dog point dia. of the set screw [mm] (catalogue value)

n = number of set screws