

Precision lock nuts

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Precision lock nuts

Industrial lock nuts with lock washers are not considered to be suitable for super-precision bearing applications because of the relatively wide manufacturing tolerances of the thread and abutment surfaces. As a result, SKF has developed a full line of precision lock nuts that are manufactured within very tight tolerances. These simple to mount devices, which locate bearings and other components accurately and efficiently on a shaft, meet the requirements of machine tool applications, both technically and economically.

Designs

All SKF precision lock nuts use friction between the mating thread flanks of the spindle shaft and lock nut to hold them in place. To apply this friction, SKF manufactures two different precision lock nut designs: those with locking pins and those with axial locking screws.

Precision lock nuts with locking pins

KMT and KMTA series precision lock nuts (**→ fig. 1**) have three locking pins, equally spaced around their circumference, with their axes parallel to the loaded thread flank (**→ fig. 2**). When tightened, the locking pins preload the threads, which provides sufficient friction to prevent the nut from loosening under normal operating conditions (**→ Loosening torque, page 376**).

KMT and KMTA lock nuts are intended for applications where high precision, simple assembly and reliable locking are required. The three equally-spaced locking pins enable these lock nuts to be accurately positioned at right angles to the shaft. However, they can also be adjusted to compensate for slight angular deviations of adjacent components (**→ Installation and removal, page 376**).

KMT and KMTA lock nuts should not be used on shafts or adapter sleeves with keyways or key slots. Damage to the locking pins can result if they align with a keyway or slot.

Both lock nut series are available standard with a thread up to 200 mm (size 40). KMT lock nuts with a thread ranging from 220 to 420 mm (sizes 44 to 84) can be supplied on request. For additional information, contact the SKF application engineering service.

KMTA lock nuts have a cylindrical outside surface and, for some sizes, a different thread pitch than KMT lock nuts. They are intended primarily for applications where space is limited and the cylindrical outside surface can be used as an element of a gap-type seal.

Fig. 1

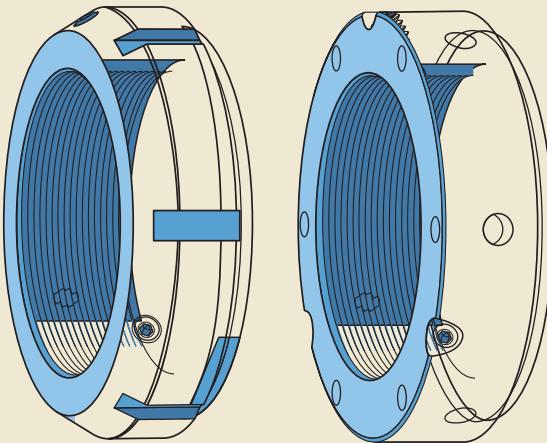
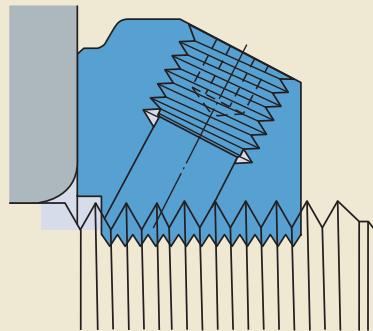


Fig. 2

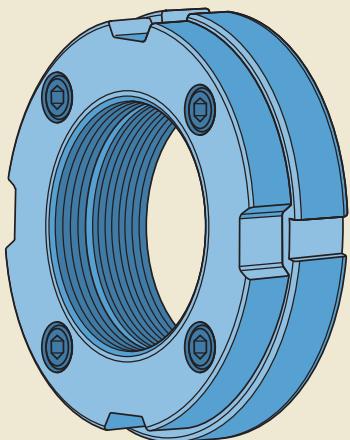


Precision lock nuts with axial locking screws

Precision lock nuts in the KMD series (→ **fig. 3**) are preloaded with axial locking screws. After the front part of the lock nut is tightened against the bearing, the axial locking screws on the rear part are tightened (→ **fig. 4**). This preloads the threads and generates sufficient friction to prevent the nut from loosening under normal operating conditions (→ *Loosening torque, page 377*).

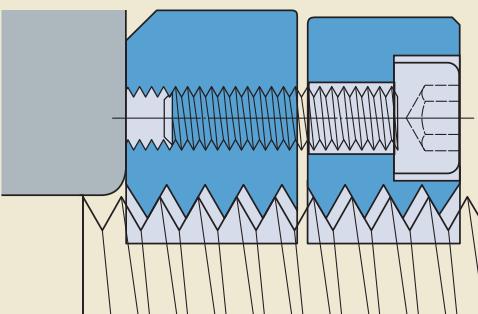
Installing and removing KMD lock nuts is simple and the axial location effective and reliable. It is possible to make micro adjustments of the axial position using the locking screws (→ *Installation and removal, page 377*).

Fig. 3



KMD

Fig. 4



Precision lock nuts

Product data

	KMT and KMTA series	KMD series
Dimension standards	ISO 965-3	ISO 965-3 Locking screws: DIN 912-12.9
Tolerances	Metric thread, 5H: ISO 965-3 Maximum axial run-out locating face / thread (for thread up to and including size 40): 0,005 mm	Metric thread, 5H: ISO 965-3 Maximum axial run-out locating face / thread: 0,005 mm
Mating shaft threads	Metric thread, 6g: ISO 965-3	
Materials	Steel	Steel For sizes 11 and 12: sintered steel (designation suffix P)
Loosening torque	<p>KMT, KMTA and KMD lock nuts are held in place on a shaft by friction. The amount of friction can vary, depending on the amount of torque applied to the grub (set) screws or axial locking screws during installation, the surface finish of the shaft thread, the amount of lubricant on the thread, etc.</p> <p>Experience shows that the locking mechanism of KMT, KMTA and KMD lock nuts is more than adequate for typical machine tool applications, provided the lock nuts are properly installed and there is only a limited amount of lubricant on the thread.</p> <p>For additional information, contact the SKF application engineering service.</p>	

Installation and removal

Installation and removal

KMT and KMD precision lock nuts have slots around their circumference to accommodate a hook or impact spanner (**→ figs. 5 and 6**). The designations of the appropriate spanners are listed in the product tables for KMT nuts (**→ page 379**) and KMD nuts (**→ page 379**). For additional information about SKF spanners, visit skf.com/mapro. In addition to the slots, KMT lock nuts with a thread ≤ 75 mm (size ≤ 15) have two opposed flats to accommodate a spanner.

KMTA precision lock nuts have holes around their circumference and in one side face (**→ fig. 7**). They can be tightened with a pin wrench, a pin-type face spanner or a tommy bar. Appropriate spanners in accordance with DIN 1810 are listed in the product tables.

All SKF precision lock nuts are designed for frequent installation and removal (provided they are not damaged).

Fig. 5

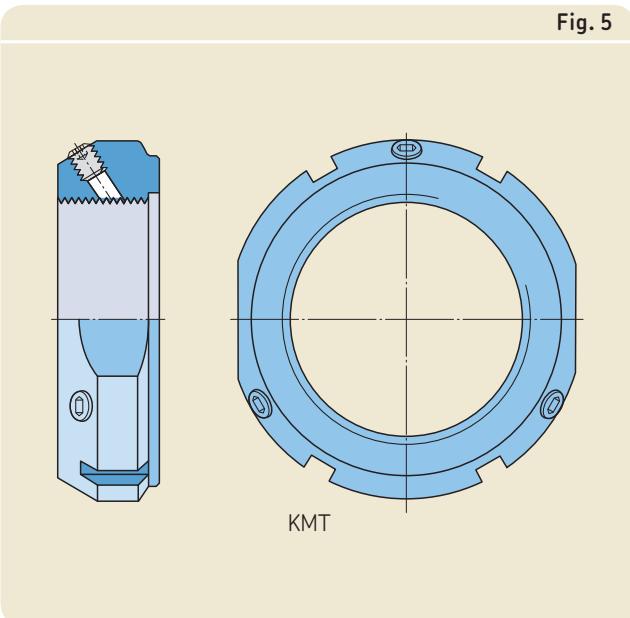


Fig. 6

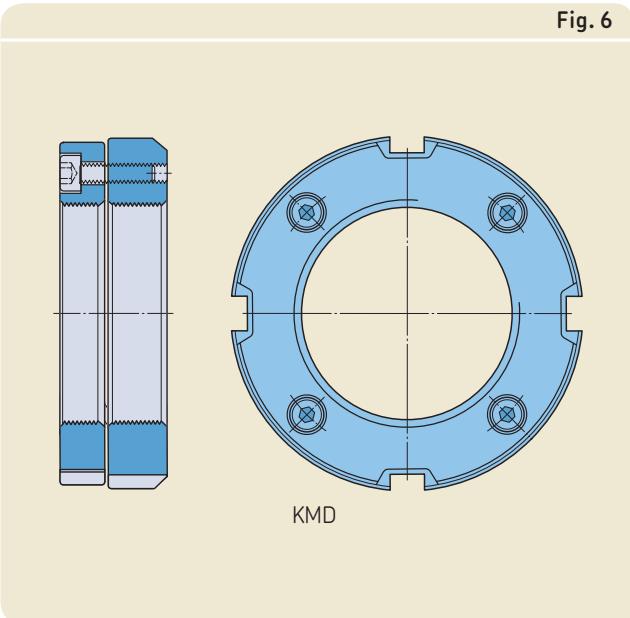
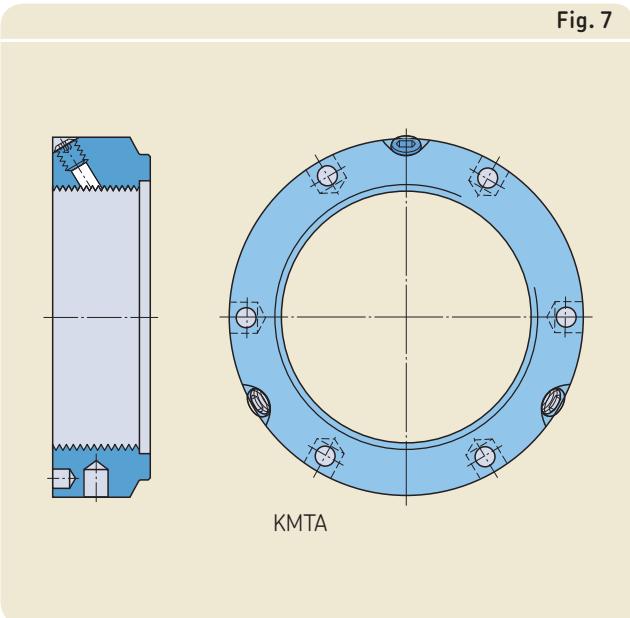


Fig. 7



Precision lock nuts

KMT and KMTA precision lock nuts

Locking

KMT and KMTA lock nuts should be locked in two phases:

- 1** Tighten the grub (set) screws carefully until the locking pins engage the shaft thread.
- 2** Tighten the grub screws alternately with a torque wrench until the recommended torque value is achieved (**→ product tables, pages 380 and 380**).

Adjustment

KMT and KMTA lock nuts are adjustable. The three equally-spaced locking pins enable these lock nuts to be accurately positioned at right angles to the shaft. However, they can also be adjusted to compensate for slight angular deviations of adjacent components. Adjustments can be made using the following procedure (**→ fig. 8**):

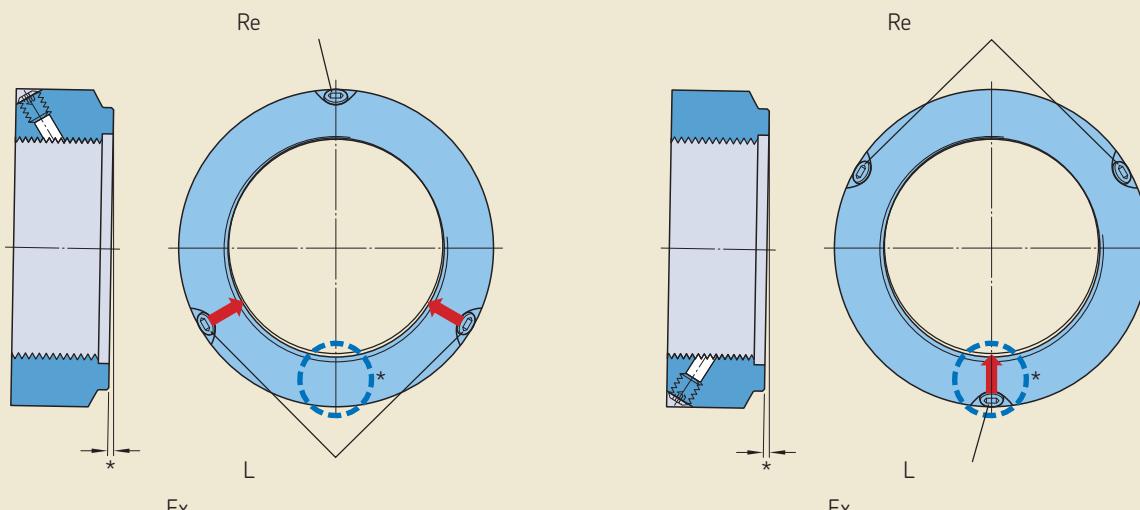
- 1** Loosen the grub screw(s) at the position showing the greatest deviation.
- 2** Tighten the remaining screw(s) equally.
- 3** Retighten the screw(s) that were loosened.
- 4** Check that the alignment of the nut, relative to the shaft, is now as required.

- 5** Repeat the procedure if the result is not adequate.

Removal

When removing KMT and KMTA lock nuts, the locking pins can still engage the shaft thread even after the grub screws have been loosened. Using a rubber hammer, tap the nut lightly in the vicinity of the pins to loosen them.

Fig. 8



Installation and removal

KMD precision lock nuts

KMD lock nuts are supplied with a protector between the front and rear part of the lock nut. The axial locking screws are “finger tight” to keep the protector in place. To install the lock nut (→ fig. 9):

- 1** Loosen the locking screws (**1**) half a turn. Do not remove them.
- 2** Remove the protector (**2**) between the two parts of the lock nut.
- 3** Hold the front and rear parts together and screw the lock nut onto the shaft. When the rear part grabs onto the shaft thread, a gap occurs between the two parts of approximately:
 - 0,6 mm for KMD 4 lock nuts
 - 1,0 mm for KMD 5 to KMD 15 lock nuts
 - 1,2 mm for KMD 16 to KMD 21 lock nuts

The remaining steps depend on whether adjustment to an exact position on the shaft is required.

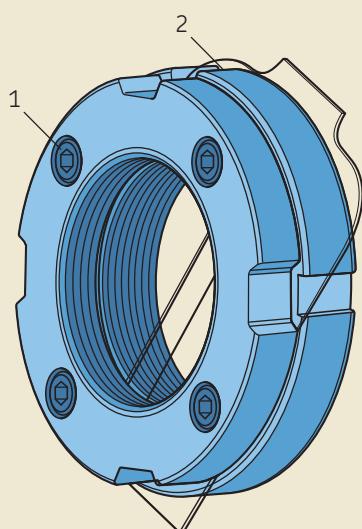
When precise positioning is not required

- 4** Screw the lock nut to its final position on the shaft thread, engaging the spanner in the slots on the front part of the nut.
- 5** Tighten the locking screws alternately in a criss-cross pattern until the recommended torque value is obtained (→ **product table, page 381**). Screw sizes are listed in the product tables.

When precise positioning is required

- 4** Screw the lock nut to an approximate position on the shaft thread, engaging the spanner in the slots on the front part of the nut.
- 5** Tighten the locking screws alternately in a criss-cross pattern to half the recommended torque value (→ **product table**). Screw sizes are listed in the product tables.
- 6** Adjust the nut to its final position on the shaft (placing the spanner in the slots on the front part of the nut).
- 7** Tighten the locking screws alternately in a criss-cross pattern to the full recommended torque.

Fig. 9

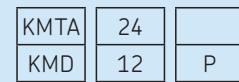


Precision lock nuts

Designation system

Examples: KMTA 24

KMD 12 P



Series

KMT Precision lock nut with locking pins

KMTA Precision lock nut with locking pins and with cylindrical outside surface (some with different thread pitch to KMT nuts)

KMD Two-part precision lock nut with axial locking screws

Nut size

0 10 mm thread diameter

1 12 mm thread diameter

2 15 mm thread diameter

3 17 mm thread diameter

4 (x5) 20 mm thread diameter

to

84 (x5) 420 mm thread diameter

Material

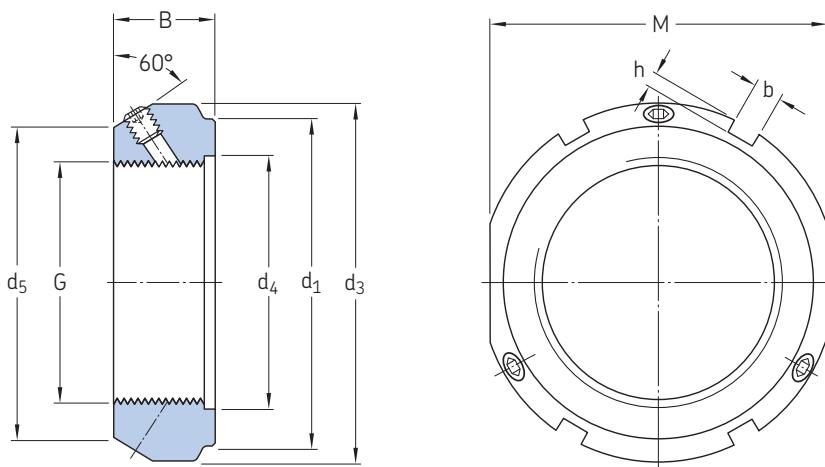
- Steel

P Sintered steel (For KMD 11 and KMD 12 lock nuts only)

Designation system

7.1 KMT precision lock nuts with locking pins

M 10x0,75 – M 200x3

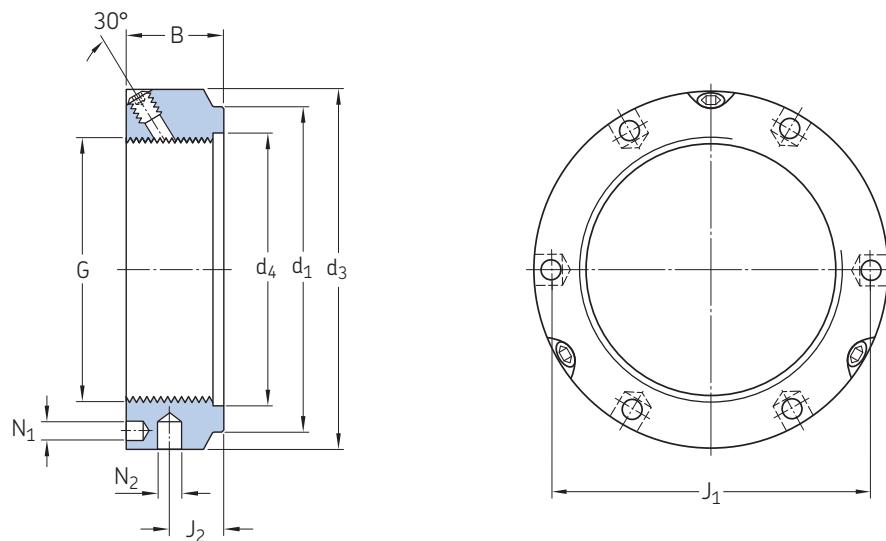


Dimensions G	d ₁	d ₃	d ₄	d ₅	B	b	h	M	Axial load carrying capacity static	Mass kg	Designations		Grub (set) screw Size	Recommended tightening torque Nm
											Lock nut	Appropriate spanner		
mm														
M 10x0,75	23	28	11	21	14	4	2	24	35	0,045	KMT 0	HN 2-3	M 5	4,5
M 12x1	25	30	13	23	14	4	2	27	40	0,05	KMT 1	HN 4	M 5	4,5
M 15x1	28	33	16	26	16	4	2	30	60	0,075	KMT 2	HN 4	M 5	4,5
M 17x1	33	37	18	29	18	5	2	34	80	0,1	KMT 3	HN 5-6	M 6	8
M 20x1	35	40	21	32	18	5	2	36	90	0,11	KMT 4	HN 5-6	M 6	8
M 25x1,5	39	44	26	36	20	5	2	41	130	0,13	KMT 5	HN 5-6	M 6	8
M 30x1,5	44	49	32	41	20	5	2	46	160	0,16	KMT 6	HN 7	M 6	8
M 35x1,5	49	54	38	46	22	5	2	50	190	0,19	KMT 7	HN 7	M 6	8
M 40x1,5	59	65	42	54	22	6	2,5	60	210	0,3	KMT 8	HN 8-9	M 8	18
M 45x1,5	64	70	48	60	22	6	2,5	65	240	0,33	KMT 9	HN 10-11	M 8	18
M 50x1,5	68	75	52	64	25	7	3	70	300	0,4	KMT 10	HN 10-11	M 8	18
M 55x2	78	85	58	74	25	7	3	80	340	0,54	KMT 11	HN 12-13	M 8	18
M 60x2	82	90	62	78	26	8	3,5	85	380	0,61	KMT 12	HN 12-13	M 8	18
M 65x2	87	95	68	83	28	8	3,5	90	460	0,71	KMT 13	HN 15	M 8	18
M 70x2	92	100	72	88	28	8	3,5	95	490	0,75	KMT 14	HN 15	M 8	18
M 75x2	97	105	77	93	28	8	3,5	100	520	0,8	KMT 15	HN 16	M 8	18
M 80x2	100	110	83	98	32	8	3,5	–	620	0,9	KMT 16	HN 17	M 8	18
M 85x2	110	120	88	107	32	10	4	–	650	1,15	KMT 17	HN 18-20	M 10	35
M 90x2	115	125	93	112	32	10	4	–	680	1,2	KMT 18	HN 18-20	M 10	35
M 95x2	120	130	98	117	32	10	4	–	710	1,25	KMT 19	HN 18-20	M 10	35
M 100x2	125	135	103	122	32	10	4	–	740	1,3	KMT 20	HN 21-22	M 10	35

Dimensions	G	d ₁	d ₃	d ₄	d ₅	B	b	h	Axial load carrying capacity static	Mass	Designations		Grub (set) screw Size	Recommended tightening torque
											Lock nut	Appropriate spanner		
mm									kN	kg	–	–	Nm	
M 110x2		134	145	112	132	32	10	4	800	1,45	KMT 22	HN 21-22	M 10	35
M 120x2		144	155	122	142	32	10	4	860	1,6	KMT 24	HN 21-22	M 10	35
M 130x2		154	165	132	152	32	12	5	920	1,7	KMT 26	TMFN 23-30	M 10	35
M 140x2		164	175	142	162	32	14	5	980	1,8	KMT 28	TMFN 23-30	M 10	35
M 150x2		174	185	152	172	32	14	5	1 040	1,95	KMT 30	TMFN 23-30	M 10	35
M 160x3		184	195	162	182	32	14	5	1 100	2,1	KMT 32	TMFN 23-30	M 10	35
M 170x3		192	205	172	192	32	14	5	1 160	2,2	KMT 34	TMFN 30-40	M 10	35
M 180x3		204	215	182	202	32	16	5	1 220	2,3	KMT 36	TMFN 30-40	M 10	35
M 190x3		214	225	192	212	32	16	5	1 280	2,4	KMT 38	TMFN 30-40	M 10	35
M 200x3		224	235	202	222	32	18	5	1 340	2,5	KMT 40	TMFN 30-40	M 10	35

7.2 KMTA precision lock nuts with locking pins

M 25x1,5 – M 200x3

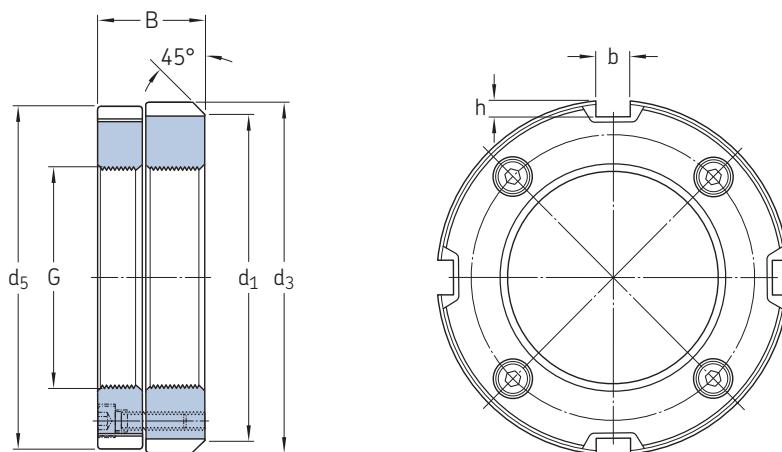


Dimensions G	d ₁	d ₃	d ₄	B	J ₁	J ₂	N ₁	N ₂	Axial load carrying capacity static	Mass kg	Designations		Grub (set) screw Size	Recommended tightening torque Nm
											Lock nut	Appropriate spanner		
mm									kN	kg	–	–	–	Nm
M 25x1,5	35	42	26	20	32,5	11	4,3	4	130	0,13	KMTA 5	B 40-42	M 6	8
M 30x1,5	40	48	32	20	40,5	11	4,3	5	160	0,16	KMTA 6	B 45-50	M 6	8
M 35x1,5	47	53	38	20	45,5	11	4,3	5	190	0,19	KMTA 7	B 52-55	M 6	8
M 40x1,5	52	58	42	22	50,5	12	4,3	5	210	0,23	KMTA 8	B 58-62	M 6	8
M 45x1,5	58	68	48	22	58	12	4,3	6	240	0,33	KMTA 9	B 68-75	M 6	8
M 50x1,5	63	70	52	24	61,5	13	4,3	6	300	0,34	KMTA 10	B 68-75	M 6	8
M 55x1,5	70	75	58	24	66,5	13	4,3	6	340	0,37	KMTA 11	B 68-75	M 6	8
M 60x1,5	75	84	62	24	74,5	13	5,3	6	380	0,49	KMTA 12	B 80-90	M 8	18
M 65x1,5	80	88	68	25	78,5	13	5,3	6	460	0,52	KMTA 13	B 80-90	M 8	18
M 70x1,5	86	95	72	26	85	14	5,3	8	490	0,62	KMTA 14	B 95-100	M 8	18
M 75x1,5	91	100	77	26	88	13	6,4	8	520	0,66	KMTA 15	B 95-100	M 8	18
M 80x2	97	110	83	30	95	16	6,4	8	620	1	KMTA 16	B 110-115	M 8	18
M 85x2	102	115	88	32	100	17	6,4	8	650	1,15	KMTA 17	B 110-115	M 10	35
M 90x2	110	120	93	32	108	17	6,4	8	680	1,2	KMTA 18	B 120-130	M 10	35
M 95x2	114	125	98	32	113	17	6,4	8	710	1,25	KMTA 19	B 120-130	M 10	35
M 100x2	120	130	103	32	118	17	6,4	8	740	1,3	KMTA 20	B 120-130	M 10	35
M 110x2	132	140	112	32	128	17	6,4	8	800	1,45	KMTA 22	B 135-145	M 10	35
M 120x2	142	155	122	32	140	17	6,4	8	860	1,85	KMTA 24	B 155-165	M 10	35
M 130x3	156	165	132	32	153	17	6,4	8	920	2	KMTA 26	B 155-165	M 10	35
M 140x3	166	180	142	32	165	17	6,4	10	980	2,45	KMTA 28	B 180-195	M 10	35
M 150x3	180	190	152	32	175	17	6,4	10	1040	2,6	KMTA 30	B 180-195	M 10	35

Dimensions G	d ₁	d ₃	d ₄	B	J ₁	J ₂	N ₁	N ₂	Axial load carrying capacity static	Mass	Designations	Grub (set) screw Size	Recommended tightening torque
									kN	kg	Lock nut	Appropriate spanner	
mm									–	–	–	Nm	
M 160x3	190	205	162	32	185	17	8,4	10	1 100	3,15	KMTA 32	B 205-220	M 10 35
M 170x3	205	215	172	32	195	17	8,4	10	1 160	3,3	KMTA 34	B 205-220	M 10 35
M 180x3	215	230	182	32	210	17	8,4	10	1 220	3,9	KMTA 36	B 230-245	M 10 35
M 190x3	225	240	192	32	224	17	8,4	10	1 280	4,1	KMTA 38	B 230-245	M 10 35
M 200x3	237	245	202	32	229	17	8,4	10	1 340	3,85	KMTA 40	B 230-245	M 10 35

7.3 KMD precision lock nuts with axial locking screws

M 20x1 – M 105x2



Dimensions G							Axial load carrying capacity static	Mass kg	Designations		Locking screws Size	Recommended tightening torque Nm
	d ₁	d ₃	d ₅	B	b	h			Lock nut	Appropriate spanner		
mm							kN	kg	–	–	–	Nm
M 20x1	38	40	39	18	5	2	70	0,11	KMD 4	HN 5-6	M 4	4,2
M 25x1,5	43	45	44	20	5	2	95	0,14	KMD 5	HN 5-6	M 4	4,2
M 30x1,5	48	50	49	20	5	2	105	0,2	KMD 6	HN 5-6	M 4	4,2
M 35x1,5	53	58	57	22	6	2,5	120	0,24	KMD 7	HN 8-9	M 4	4,2
M 40x1,5	58	63	62	22	6	2,5	130	0,27	KMD 8	HN 8-9	M 4	4,2
M 45x1,5	66,5	71,5	70,5	22	7	3	150	0,36	KMD 9	HN 10-11	M 4	4,2
M 50x1,5	70	75	74	25	7	3	200	0,41	KMD 10	HN 10-11	M 4	4,2
M 55x2	75	80	79	25	7	3	160	0,46	KMD 11 P	HN 12-13	M 4	4,2
M 60x2	80	85	84	26	7	3	175	0,5	KMD 12 P	HN 12-13	M 4	4,2
M 65x2	85	90	89	28	8	3,5	295	0,63	KMD 13	HN 14	M 5	8,4
M 70x2	90	95	94	28	8	3,5	320	0,67	KMD 14	HN 14	M 5	8,4
M 75x2	95	100	99	28	8	3,5	340	0,72	KMD 15	HN 15	M 5	8,4
M 80x2	105	110	109	32	8	3,5	445	1,05	KMD 16	HN 17	M 6	14,2
M 85x2	110	115	114	32	10	4	470	1,2	KMD 17	HN 17	M 6	14,2
M 90x2	115	120	119	32	10	4	500	1,2	KMD 18	HN 18-20	M 6	14,2
M 95x2	120	125	124	32	10	4	525	1,25	KMD 19	HN 18-20	M 6	14,2
M 100x2	125	130	129	32	10	4	555	1,3	KMD 20	HN 18-20	M 6	14,2
M 105x2	130	135	134	32	10	4	580	1,35	KMD 21	HN 18-20	M 6	14,2

7.3

