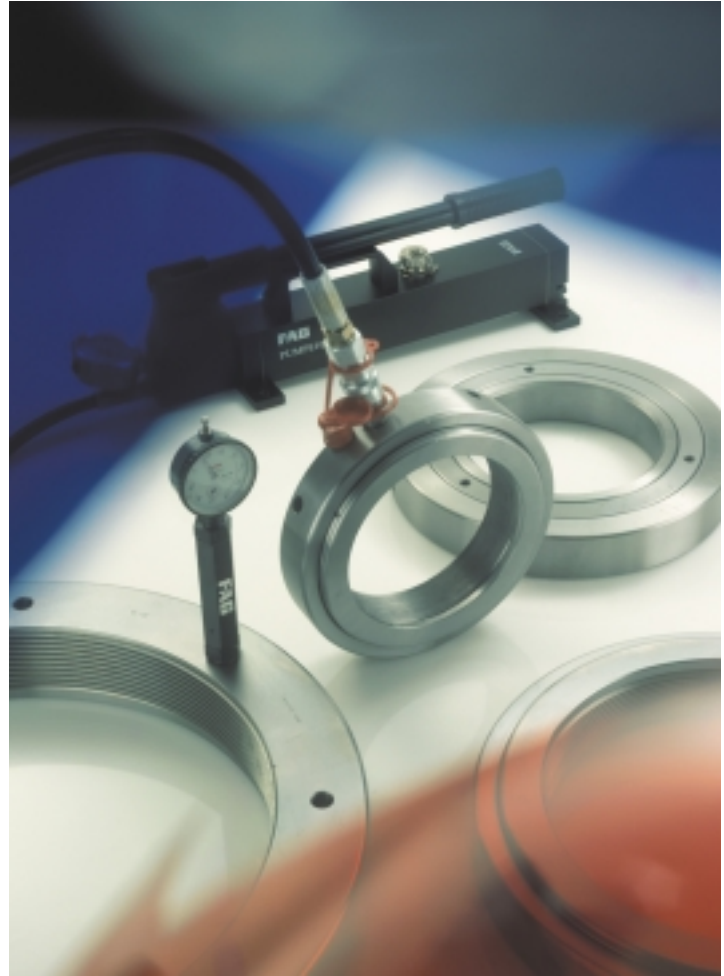
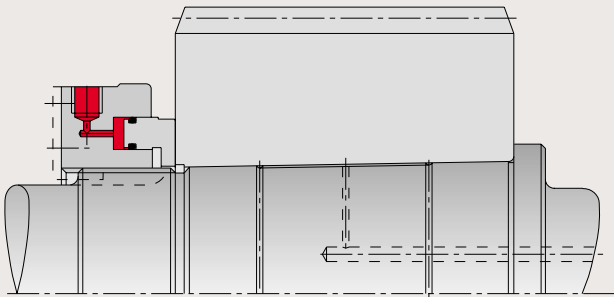
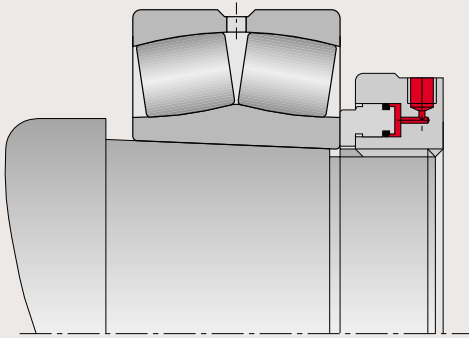


## FAG HYDRAULIC NUTS



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## APPLICATION · DESIGN PRINCIPLE

### Application

FAG hydraulic nuts are used for pressing parts with a tapered bore onto tapered seats. They are used primarily where the drive-up force of locknuts and pressure bolts is not sufficient.

Main fields of application:

- Mounting of rolling bearings with a tapered bore. The bearings can be mounted directly on tapered shaft seats or on adapter or withdrawal sleeves. Hydraulic nuts can also be used to dismount sleeve-mounted bearings.
- Mounting of couplings, gear-wheels, impellers, ship's propellers ...

### Design Principle

FAG hydraulic nuts consist of an annular body and a piston, fig. 1. The piston is operated hydraulically. The pressure chamber is sealed by two O-rings of soft PVC.

The hydraulic nuts are designed for a maximum oil pressure of 800 bar.

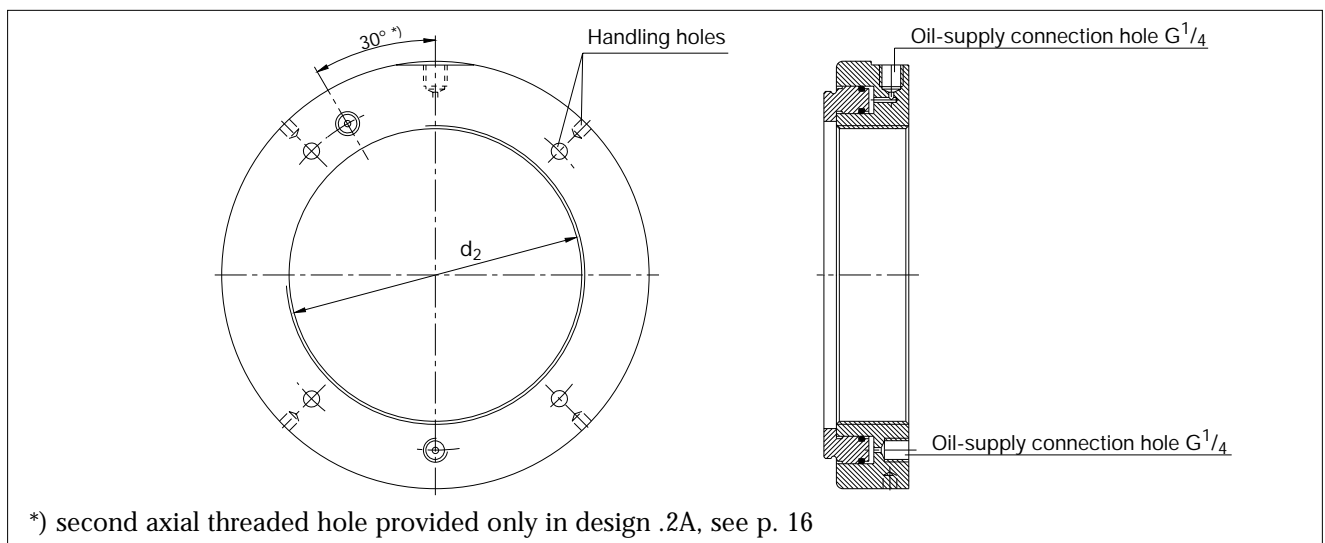
Their stroke is powerful enough that the rolling bearings or other parts can be mounted in a single operation.

The bore  $d_2$  in the annular body is available with a metric fine thread, a trapezoidal thread or an inch thread so that suitable FAG hydraulic nuts are available for all currently used sleeve and shaft

threads. Where higher drive-up forces are required FAG also offer hydraulic nuts with a straight bore (reinforced design).

FAG hydraulic nuts feature two oil-supply connection holes with a  $G^{1/4}$  thread. In devices with a threaded bore, one hole each is provided in the face and in the O.D., in the reinforced design both are located in the O.D. If a dial gauge (page 16) is used, an additional connection hole in the face may be required.

Threaded-bore hydraulic nuts have handling holes for easier handling. The larger the hydraulic nut, the larger the number of these holes, see table in fig. 2. Larger hydraulic nuts also feature threaded holes for eyebolts to facilitate handling.



**1: FAG hydraulic nut (design with threaded bore)**

## DESIGN PRINCIPLE · DESIGN VARIATIONS

Thread d <sub>2</sub>		Handling holes		Diameter
		Number Face	O.D.	
mm	inch			mm
50...100	3.527...3.918	2	4	10
105...345	4.122...13.339	4	4	12
350...395	14.170...14.957	4	4	14
≥400	≥15.745	6	6	16

### 2: Holes in the annular body for easier handling of the hydraulic nuts

#### Design Variations

FAG hydraulic nuts are available in various designs:

- with a metric fine thread and with a trapezoidal thread

This design is suitable for all standardized metric adapter sleeves and withdrawal sleeves.

Order designations:

**RKP50** to **RKP200** (metric fine thread to DIN 13) and **RKP205** to **RKP1180A** (trapezoidal thread to DIN 103)

- with an inch thread

These hydraulic nuts comply with the ABMA Standards for Bearing Mounting Accessories, Section 8, Locknut Series N-00.

Order designations:

**RKP90Z** to **RKP530Z**.

- of reinforced design

These hydraulic nuts have a straight bore machined to H7. They were primarily developed for shipbuilding, because of the higher mounting forces required in this field and because the hydraulic nuts are usually mounted on a nut with a centering rim.

Order designations:

**RKP100.529554A** to **RKP900.526225A**

Hydraulic nuts with a dial gauge (see page 16) as well as special designs are available from FAG on request.

#### Replacement Seals

Seals are subject to wear. FAG supply replacement seals for all hydraulic nuts (1 set comes with every hydraulic nut).

Order examples:

**RKP115.169756** (for RKP115)

**RKP160Z.169756** (for RKP160Z)

**RKP600.526217A.169756** (for RKP600.526217A)

## PRESSURE GENERATORS · CONNECTION PIECES

### Pressure Generators, Connection Pieces

Hydraulic nuts are oil-pressure operated. FAG offer an extensive programme of accessories which com-

prises pressure generators and connection pieces. Fig. 3 shows which FAG pressure generators are required for operating the hydraulic nuts.

We recommend to use FAG hand pump sets because they are easy to operate, pump larger volumes of oil and can be used universally.

Pressure generator required	Hydraulic nut (standard)	Hydraulic nut (reinforced design)	Hydraulic nut (inch thread)
PUMPE1000.0,7L	RKP50	RKP100.529554A	RKP90Z
	⋮	⋮	⋮
PUMPE1000.4L	RKP395	RKP300.526205A	RKP380Z
	⋮	⋮	⋮
PUMPE1000.4L	RKP400A	RKP325.526206A	RKP400Z
	⋮	⋮	⋮
PUMPE1000.8L	RKP800A	RKP525.526214A	RKP530Z
	⋮	⋮	⋮
PUMPE1000.8L	RKP830A	RKP550.526215A	
	⋮	⋮	
PUMPE1000.8L	RKP1120A	RKP675.526220A	
	⋮	⋮	
AGGREGAT.E800 (electrically operated)	RKP1180A	RKP700.526221A	

### 3: FAG pressure generators for FAG hydraulic nuts

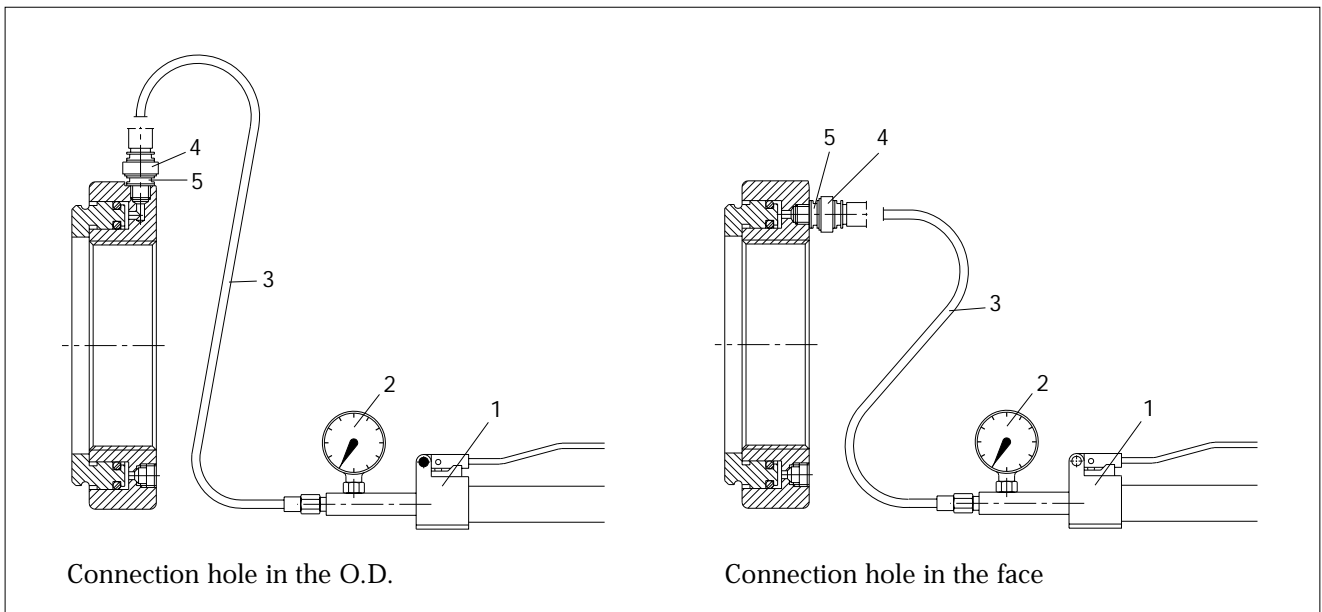


**4: FAG hand pump set that can be connected to hydraulic nuts up to RKP800A (example)**

## PRESSURE GENERATORS · CONNECTION PIECES

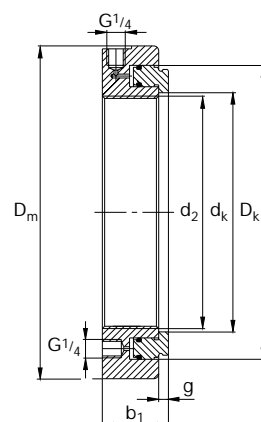
FAG hand pump set consisting of

- 1) Hand pump with 4-liter oil container/1000 bar
- 2) Pressure gauge 0-1000 bar
- 3) Extreme-pressure hose, 2 m long
- 4) Socket
- 5) Plug (G 1/4 thread)



### 5: Connection of a hand pump set to a hydraulic nut up to RKP800A (example)

## FAG HYDRAULIC NUTS



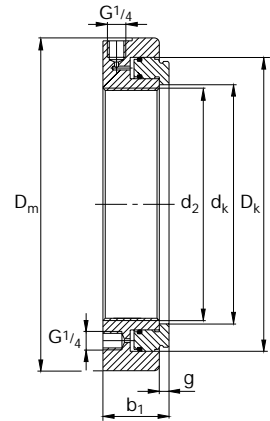
Hydraulic nut Order designation	Thread d <sub>2</sub> mm	Dimensions						Stroke	Piston surface cm <sup>2</sup>	Mass ≈ kg	Drive-up force at 800 bar kN
		D <sub>m</sub>	b <sub>1</sub>	D <sub>k</sub>	d <sub>k</sub>	g					
RKP50	M50x1.5	110	40	88	51	2	4	30.6	2.3	245	
RKP55	M55x2	118	40	92	56	2	4	31.2	2.6	250	
RKP60	M60x2	125	40	96	61	2	4	31.6	2.8	253	
RKP65	M65x2	132	40	103	66	3	4	35.5	3.1	284	
RKP70	M70x2	140	40	110	71	3	4	41	3.4	328	
RKP75	M75x2	145	40	116	76	3	4	44.8	3.6	359	
RKP80	M80x2	150	40	122	81	3	4	49	3.8	392	
RKP85	M85x2	155	40	126	86	3	4	49.3	3.9	394	
RKP90	M90x2	160	40	130	91	3	5	50	4.2	395	
RKP95	M95x2	165	40	136	96	3	5	52	4.3	416	
RKP100	M100x2	170	42	142	101	3	5	54.5	4.7	435	
RKP105	M105x2	175	42	147	106	6	5	56.6	4.7	453	
RKP110	M110x2	180	43	152	111	6	5	59	5	470	
RKP115	M115x2	185	43	157	116	6	5	60.8	5.2	487	
RKP120	M120x2	190	43	162	121	6	5	63	5.4	504	
RKP125	M125x2	195	44	167	126	7	5	65	5.6	520	
RKP130	M130x2	200	44	171	131	7	5	65	5.8	520	
RKP135	M135x2	205	45	176	136	7	5	66.6	6	533	
RKP140	M140x2	210	45	182	141	7	5	69	6.3	552	
RKP145	M145x2	215	46	186	146	7	5	70.6	6.6	565	
RKP150	M150x2	220	46	191	151	7	5	75.3	6.8	602	
RKP155	M155x3	225	46	200	156	7	5	81.8	7.2	654	
RKP160	M160x3	235	47	206	161	7	6	87.2	8	698	
RKP165	M165x3	240	47	211	166	7	6	92.3	8.2	739	
RKP170	M170x3	245	48	216	171	7	6	94.7	8.6	758	
RKP180	M180x3	255	48	227	181	7	6	103	9.1	824	
RKP190	M190x3	270	50	240	191	8	8	116	10.5	928	
RKP200	M200x3	280	50	251	201	8	8	125	11.5	1000	
RKP205	Tr205x4	290	51	258	207	8	8	132.2	12.3	1058	
RKP210	Tr210x4	295	52	263	212	9	9	135	12.7	1080	
RKP215	Tr215x4	300	53	268	217	9	9	137.7	13.2	1102	
RKP220	Tr220x4	305	53	273	222	9	9	144.2	13.5	1154	
RKP225	Tr225x4	315	54	282	227	9	10	153	15	1224	
RKP230	Tr230x4	320	54	287	232	9	10	160	15.3	1280	
RKP235	Tr235x4	325	54	290	237	9	10	161.7	15.5	1294	
RKP240	Tr240x4	330	55	296	242	9	10	165.3	16.1	1323	
RKP250	Tr250x4	345	56	310	252	10	10	182.2	18	1458	
RKP260	Tr260x4	355	57	319	262	10	11	188	19	1504	

Hydraulic nuts can be locked in a similar manner as nuts, see page 11.

FAG also offer replacement seals for hydraulic nuts (suffix .169756).

Order example (for RKP115): RKP115.169756. Every hydraulic nut is delivered with 1 set of seals.

# FAG HYDRAULIC NUTS

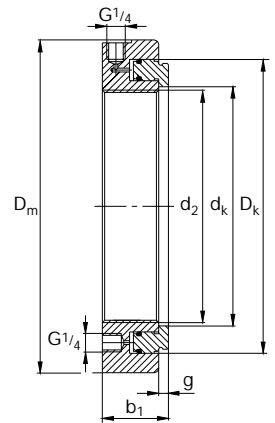


Hydraulic nut Order designation	Thread d <sub>2</sub> mm	Dimensions						Stroke	Piston surface cm <sup>2</sup>	Mass ≈ kg	Drive-up force at 800 bar kN
		D <sub>m</sub>	b <sub>1</sub>	D <sub>k</sub>	d <sub>k</sub>	g					
RKP270	Tr270x4	370	58	332	272	10	12	196	21.1	1568	
RKP275	Tr275x4	375	58	337	277	10	12	204	21.5	1632	
RKP280	Tr280x4	380	59	342	282	10	12	211.7	22.3	1694	
RKP290	Tr290x4	390	60	352	292	10	13	218.3	23.3	1747	
RKP295	Tr295x4	400	60	362	297	10	13	230	25	1840	
RKP300	Tr300x4	405	61	365	302	10	13	237	25.8	1896	
RKP310	Tr310x5	415	62	375	312	10	13	249	27	1992	
RKP315	Tr315x5	420	62	380	317	10	13	252.5	27.5	2020	
RKP320	Tr320x5	430	63	389	322	10	14	264	29.9	2112	
RKP330	Tr330x5	440	64	398	332	11	14	270.8	31	2166	
RKP335	Tr335x5	445	65	403	337	11	14	275	32	2200	
RKP340	Tr340x5	450	65	408	342	11	14	284	32.5	2272	
RKP345	Tr345x5	455	66	413	347	11	14	288	33.5	2304	
RKP350	Tr350x5	465	66	422	352	11	14	306	35	2448	
RKP355	Tr355x5	470	67	427	357	11	15	304	36.5	2432	
RKP360	Tr360x5	475	67	431	362	11	15	313	37	2504	
RKP365	Tr365x5	482	67	436	367	11	15	317	38	2536	
RKP370	Tr370x5	490	68	444	372	11	16	323	40	2584	
RKP375	Tr375x5	495	68	450	377	11	16	334	41	2672	
RKP380	Tr380x5	500	69	454	382	11	16	337	41.5	2696	
RKP385	Tr385x5	505	69	460	387	11	16	348	42	2784	
RKP395	Tr395x5	512	69	470	397	11	16	356	43	2848	
RKP400A	Tr400x5	525	71	477	402	11	17	368	47	2944	
RKP410A	Tr410x5	535	71	485	412	11	17	382	48	3056	
RKP415A	Tr415x5	540	71	490	417	11	17	386	49	3088	
RKP420A	Tr420x5	545	72	495	422	12	17	390	50	3120	
RKP430A	Tr430x5	555	74	505	432	12	17	398	52	3184	
RKP435A	Tr435x5	560	74	510	437	12	17	403	53	3224	
RKP440A	Tr440x5	565	74	519	442	12	17	425	54	3400	
RKP450A	Tr450x5	580	76	530	452	12	17	442	58	3536	
RKP460A	Tr460x5	590	76	540	462	12	18	450	59.5	3600	
RKP470A	Tr470x5	600	76	550	472	12	18	459	61	3672	
RKP480A	Tr480x5	612	76	560	482	12	18	460	63	3680	
RKP490A	Tr490x5	625	80	575	492	13	19	506	69	4048	
RKP500A	Tr500x5	635	80	585	502	13	20	523	70	4185	
RKP510A	Tr510x6	645	80	595	512	13	20	533	72	4264	
RKP520A	Tr520x6	657	80	605	522	13	21	542	75	4336	
RKP530A	Tr530x6	670	83	617	532	13	22	562	80	4496	
RKP540A	Tr540x6	680	83	628	542	13	22	581	82.5	4648	
RKP550A	Tr550x6	692	83	639	552	13	22	592	84.5	4736	

Hydraulic nuts can be locked in a similar manner as nuts, see page 11.  
 FAG also offer replacement seals for hydraulic nuts (suffix .169756).  
 Order example (for RKP330): RKP330.169756. Every hydraulic nut is delivered with 1 set of seals.



# FAG HYDRAULIC NUTS

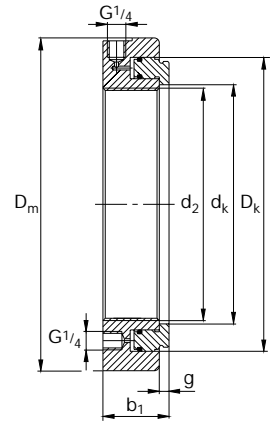


Hydraulic nut Order designation	Thread d <sub>2</sub> mm	Dimensions						Stroke	Piston surface cm <sup>2</sup>	Mass ≈ kg	Drive-up force at 800 bar kN
		D <sub>m</sub>	b <sub>1</sub>	D <sub>k</sub>	d <sub>k</sub>	g					
RKP560A	Tr560x6	705	83	650	562	13	22	612	88	4896	
RKP570A	Tr570x6	715	85	660	572	13	23	631	92	5048	
RKP580A	Tr580x6	725	85	670	582	13	23	641	93	5128	
RKP590A	Tr590x6	740	85	685	592	13	23	666	98	5328	
RKP600A	Tr600x6	750	85	695	603	13	23	677	100	5416	
RKP610A	Tr610x6	760	88	705	613	14	24	687	104	5496	
RKP625A	Tr625x6	775	88	720	628	14	24	702	107	5516	
RKP630A	Tr630x6	780	88	725	633	14	24	728	109	5824	
RKP650A	Tr650x6	805	88	748	653	14	24	763	115	6104	
RKP655A	Tr655x6	810	88	753	658	14	24	768	116	6144	
RKP670A	Tr670x6	825	90	768	673	14	24	795	121	6360	
RKP680A	Tr680x6	837	90	780	683	14	24	819	124	6552	
RKP690A	Tr690x6	850	90	792	693	14	25	844	128	6752	
RKP695A	Tr695x6	855	93	798	698	14	25	862	133	6896	
RKP710A	Tr710x7	870	93	812	713	14	25	877	136	7020	
RKP720A	Tr720x7	883	95	825	723	15	25	928	144	7424	
RKP740A	Tr740x7	910	95	848	743	15	25	991	154	7928	
RKP750A	Tr750x7	922	96	862	753	15	26	1033	160	8265	
RKP760A	Tr760x7	935	96	872	763	15	26	1045	165	8360	
RKP780A	Tr780x7	955	98	890	783	15	28	1068	172	8544	
RKP800A	Tr800x7	970	98	909	803	16	28	1079	170	8632	
RKP830A	Tr830x7	1000	98	938	833	16	29	1101	176	8808	
RKP850A	Tr850x7	1020	98	960	853	16	29	1156	180	9248	
RKP880A	Tr880x7	1050	98	988	883	16	29	1148	185	9184	
RKP900A	Tr900x7	1070	100	1012	903	16	29	1251	194	10008	
RKP930A	Tr930x8	1100	100	1042	933	16	30	1290	200	10320	
RKP950A	Tr950x8	1120	100	1065	953	16	30	1365	210	10920	
RKP1000A	Tr1000x8	1170	100	1123	1003	16	30	1490	228	11920	
RKP1060A	Tr1060x8	1255	115	1185	1063	18	32	1610	300	12880	
RKP1080A	Tr1080x8	1280	118	1207	1083	18	33	1680	322	13440	
RKP1120A	Tr1120x8	1340	125	1260	1123	19	36	1900	392	15200	
RKP1180A	Tr1180x8	1430	135	1315	1183	22	39	2100	503	16800	

Hydraulic nuts can be locked in a similar manner as nuts, see page 11.  
 FAG also offer replacement seals for hydraulic nuts (suffix .169756).  
 Order example (for RKP610A): RKP610A.169756. Every hydraulic nut is delivered with 1 set of seals.

# FAG HYDRAULIC NUTS

## Inch Thread



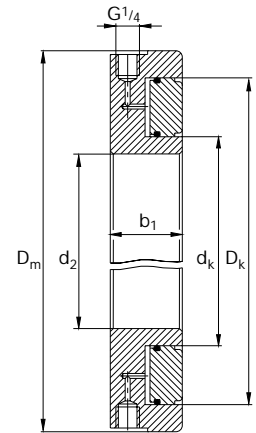
Thread for RKP90Z to RKP320Z:  
American National Form Threads Class 3  
Thread for RKP340Z to RKP530Z:  
Acme General Purpose Threads Class 3G

Hydraulic nut  Order designation	Thread		Dimensions					Stroke	Piston surface cm <sup>2</sup>	Mass ≈ kg	Drive-up force at 800 bar kN			
	d <sub>2</sub> mm	Pitch diameter inch	Number of turns per inch	D <sub>m</sub> mm	b <sub>1</sub>	D <sub>K</sub>	d <sub>K</sub>					g		
RKP90Z	89.586	3.527	88.212	3.4729	12	160	40	130	91	3	5	50	4.2	395
RKP95Z	94.742	3.730	93.368	3.6759	12	165	40	136	96	3	5	52	4.3	416
RKP100Z	99.517	3.918	98.143	3.8639	12	170	42	142	101	3	5	54	4.7	435
RKP105Z	104.699	4.122	103.325	4.0679	12	175	42	147	106	5	5	57	4.7	455
RKP110Z	109.855	4.325	108.481	4.2709	12	180	43	152	111	6	5	59	5	470
RKP120Z	119.786	4.716	118.412	4.6619	12	190	43	162	121	6	5	63	5.4	504
RKP130Z	129.692	5.106	128.318	5.0519	12	200	44	171	131	7	5	65	5.8	520
RKP140Z	139.624	5.497	138.25	5.4429	12	210	45	182	141	7	5	69	6.3	552
RKP150Z	149.555	5.888	148.181	5.8339	12	220	46	191	151	7	5	75.3	6.8	602
RKP160Z	159.614	6.284	157.551	6.2028	8	235	47	206	161	7	6	87.2	8	698
RKP170Z	169.139	6.659	167.067	6.5778	8	245	48	216	171	7	6	94.7	8.6	758
RKP180Z	179.476	7.066	177.414	6.9848	8	255	48	227	181	7	6	103	8.1	824
RKP190Z	189.789	7.472	187.726	7.3908	8	270	50	240	191	8	8	116	10.5	928
RKP200Z	199.314	7.847	197.251	7.7658	8	280	50	251	201	8	8	125	11.5	1000
RKP220Z	219.151	8.628	217.089	8.5468	8	305	53	273	222	9	9	144.2	13.5	1154
RKP240Z	239.827	9.442	237.076	9.3337	6	330	55	296	242	9	10	165.3	16.1	1323
RKP260Z	258.877	10.192	256.126	10.0837	6	355	57	319	262	10	11	188	19	1504
RKP280Z	279.502	11.004	276.751	10.8975	6	380	59	342	282	10	12	211.7	22.3	1694
RKP300Z	299.339	11.785	296.588	11.6767	6	405	61	365	302	10	13	237	25.8	1896
RKP320Z	319.075	12.562	316.324	12.4537	6	430	63	389	322	10	14	264	29.9	2112
RKP340Z	338.811	13.339	335.763	13.2190	5	450	65	408	342	11	14	284	32.5	2272
RKP360Z	359.918	14.170	356.87	14.0500	5	475	67	431	362	11	15	313	37	2504
RKP380Z	379.908	14.957	376.86	14.8370	5	500	69	454	382	11	16	337	41.5	2696
RKP400Z	399.923	15.745	396.875	15.6250	5	525	71	477	402	11	17	368	47	2944
RKP420Z	419.913	16.532	416.865	16.4120	5	545	72	495	422	11	17	390	50	3120
RKP440Z	439.903	17.319	436.855	17.1990	5	565	74	519	442	12	17	425	54	3400
RKP460Z	459.918	18.107	456.87	17.9870	5	590	76	540	462	12	18	450	59.5	3600
RKP480Z	479.908	18.894	476.86	18.7740	5	612	76	560	482	12	18	460	63	3680
RKP500Z	499.923	19.682	496.875	19.5620	5	635	80	585	502	13	20	523	70	4185
RKP530Z	530.022	20.867	526.339	20.7220	4	670	83	617	542	13	22	562	80	4496

Hydraulic nuts can be locked in a similar manner as nuts, see page 11.  
FAG also offer replacement seals for hydraulic nuts (suffix .169756).  
Order example (for RKP160Z): RKP160Z.169756. Every hydraulic nut is delivered with 1 set of seals.

# FAG HYDRAULIC NUTS

## Reinforced Design



Hydraulic nut  Order designation	Dimensions						Stroke	Piston surface  cm <sup>2</sup>	Mass  ≈ kg	Drive-up force  at 800 bar  kN
	d <sub>2</sub> <sup>H7</sup>  mm	D <sub>m</sub>	b <sub>1</sub>	D <sub>k</sub>	d <sub>k</sub>					
RKP100.529554A	100	220	40	180	125	10	132	9.5	1060	
RKP125.529608A	125	245	40	200	150	10	137	9.8	1100	
RKP150.526067A	150	270	40	226	180	10	147	12.5	1170	
RKP175.526200A	175	305	45	250	205	11	161	17	1280	
RKP200.526201A	200	330	50	280	230	12	200	21	1600	
RKP225.526202A	225	365	50	313	255	12	259	23	2070	
RKP250.526203A	250	390	50	345	280	12	319	28	2550	
RKP275.526204A	275	430	50	380	305	12	403	34	3220	
RKP300.526205A	300	470	55	410	335	13	439	44	3510	
RKP325.526206A	325	500	55	440	360	13	503	49	4020	
RKP350.526207A	350	540	55	475	385	13	608	57	4860	
RKP375.526208A	375	575	55	510	410	13	723	65	5780	
RKP400.526209A	400	620	60	545	440	15	812	83	6500	
RKP425.526210A	425	650	60	575	465	15	899	90	7190	
RKP450.526211A	450	690	65	610	490	17	1037	100	8290	
RKP475.526212A	475	725	65	642	515	17	1154	120	9230	
RKP500.526213A	500	760	70	675	540	20	1288	142	10300	
RKP525.526214A	525	800	70	710	565	20	1452	158	11620	
RKP550.526215A	550	835	75	742	590	22	1590	183	12720	
RKP575.526216A	575	870	75	775	615	22	1747	197	13980	
RKP600.526217A	600	910	80	808	645	25	1860	230	14880	
RKP625.526218A	625	945	80	840	670	25	2016	248	16130	
RKP650.526219A	650	980	85	875	695	28	2220	282	17760	
RKP675.526220A	675	1020	85	906	720	28	2375	307	19000	
RKP700.526221A	700	1060	90	940	750	30	2522	351	20180	
RKP750.526222A	750	1130	95	1007	800	32	2938	431	23500	
RKP800.526223A	800	1205	100	1070	855	35	3250	500	26000	
RKP850.526224A	850	1275	105	1135	905	38	3685	583	29480	
RKP900.526225A	900	1350	110	1200	960	40	4072	688	32580	

FAG also offer replacement seals for hydraulic nuts (suffix .169756).  
Order example (for RKP600.526217A): RKP600.526217A.169756. Every hydraulic nut is delivered with 1 set of seals.

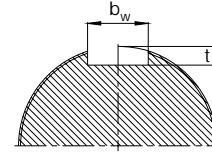
# LOCKING DEVICES THAT PREVENT ROTATION

In various applications hydraulic nuts remain on the shaft or on the adapter sleeve. For these applications FAG offer locking devices in three different designs, fig. 6.

Locking devices of designs SA and SC consist of clamps and hexagon head screws. The shaft must be adequately slotted. Slot dimensions are listed in fig. 7. Adapter sleeves always feature this slot. The threaded holes for the hexagon head screws are drilled into the annular body on mounting.

Locking device SB consists of a setscrew and copper pin.

Ordering example:  
Hydraulic nut with trapezoidal thread 400x5, U-shaped locking device with hexagon head screws:  
**RKP400A.SC**



### Hydraulic nut

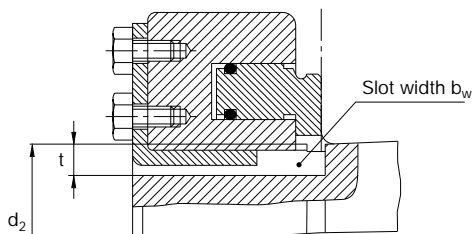
Annular body with thread  
from to

### Shaft slot

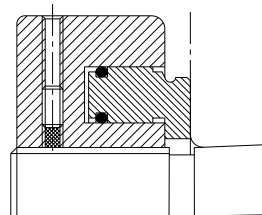
$b_w$   $t$   
mm

RKP100	RKP150	14	7
RKP155	RKP200	16	8
RKP205	RKP260	22	9
RKP270	RKP300	26	9
RKP310	RKP400	30	10
RKP420	RKP460	34	10
RKP480	RKP500	38	12
RKP530	RKP600	42	14
RKP630	RKP670	48	14
RKP710	RKP900	55	15
RKP930	RKP1120	65	16

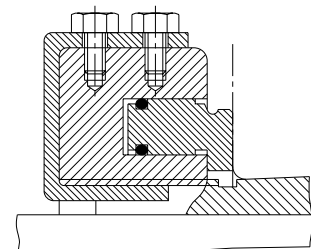
**7: Dimensions of shaft slots for locking devices SA and SC**



Design SA  
L-shaped locking device with  
hexagon head screws



Design SB  
Setscrew and copper pin



Design SC  
U-shaped locking device with  
hexagon head screws

**6: Locking devices for FAG hydraulic nuts**

## ROLLING BEARING MOUNTING WITH HYDRAULIC NUTS

Hydraulic nuts are used for mounting rolling bearings with a tapered bore. The mounting is carried out either “dry” or hydraulically. If the hydraulic method is employed, oil is pumped between the mating surfaces to build up an oil film so that very little drive-up force is required from the hydraulic nut.

Fig. 8 shows a spherical roller bearing directly driven up a tapered shaft. First the bearing is placed on the tapered seat, and the hydraulic nut is screwed onto the shaft until the bearing sits firmly on the shaft.

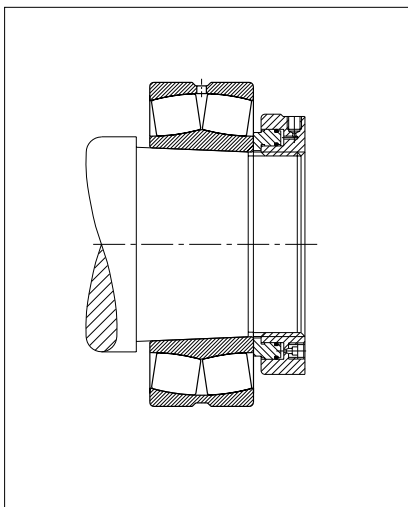
The bearing is driven upon its seat by actuating the hydraulic nut. The amount of axial displacement of the bearing depends on the required amount of radial clearance reduction. When driving the bearing onto the tapered seat, the radial clearance must be checked regularly by feeler gauges.

With the hydraulic method, the oil pressure must be relieved for radial clearance measuring. If the radial clearance cannot be measured, for example because it is not permitted by the housing shape, the axial drive up can be measured instead. On pages 14 and 15 the values for the required

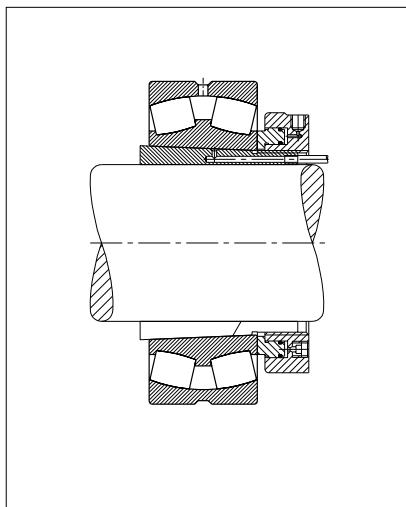
radial clearance reduction and for the corresponding axial drive up for cylindrical roller bearings and spherical roller bearings are listed.

When using the hydraulic method, it takes about 10 to 30 minutes (depending on the size of the bearing) until the oil has cleared the fitting joint after mounting. Then the hydraulic nut can be removed, and the locknut or sleeve nut can be screwed on and locked.

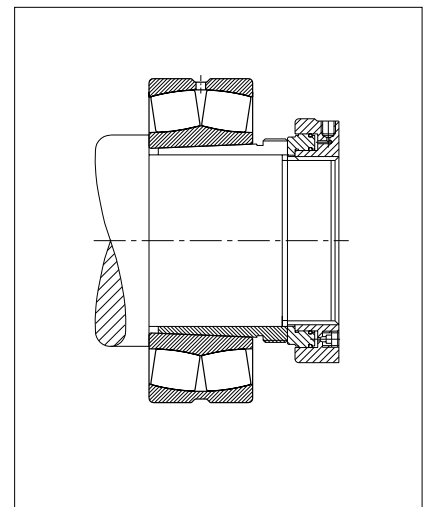
Rolling bearings that are mounted on adapter or withdrawal sleeves can be fitted in the same way (figs. 9 and 10).



**8: Pressing a spherical roller bearing onto a tapered shaft journal**



**9: Hydraulic mounting of a spherical roller bearing on an adapter sleeve**



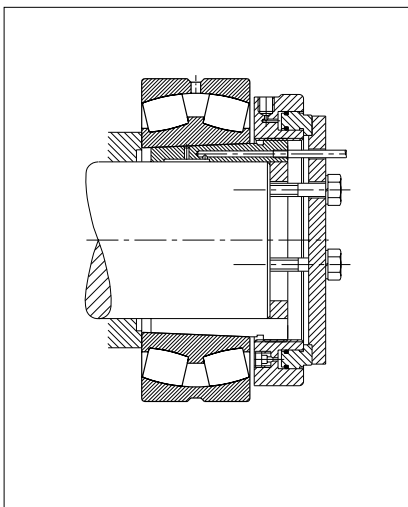
**10: Non-hydraulic mounting of a spherical roller bearing with a withdrawal sleeve**

## ROLLING BEARING MOUNTING WITH HYDRAULIC NUTS

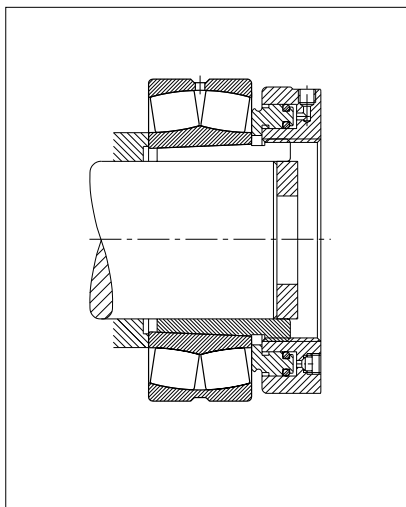
Hydraulic nuts are also suitable for mounting hydraulic withdrawal sleeves, fig. 11. The piston of the hydraulic nut is supported by a plate which is bolted to the shaft. This is not necessary when mounting hydraulic adapter sleeves, fig. 9.

Fig. 12 shows how to dismount a withdrawal sleeve. If the shaft is not long enough to prevent constriction of the thread, the withdrawal sleeve must be supported by a thick-walled auxiliary ring.

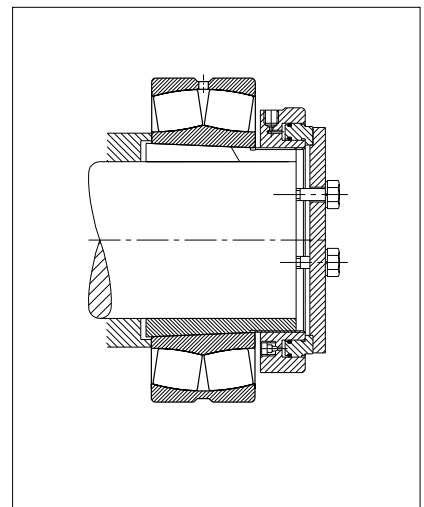
Adapter sleeves can be dismounted if the bearing's inner ring abuts axially and the piston of the hydraulic nut is supported by a mounting plate, fig. 13.



**11: Hydraulic mounting of a spherical roller bearing on a withdrawal sleeve**



**12: Dismounting of a withdrawal sleeve**



**13: Dismounting of an adapter sleeve**

# RADIAL CLEARANCE REDUCTION FOR FAG SPHERICAL ROLLER BEARINGS WITH A TAPERED BORE

Nominal bore diameter d over to mm mm		Radial clearance prior to mounting Clearance group						Radial clearance reduction <sup>1)</sup> min max mm mm		Drive up on taper 1:12 <sup>1)</sup>				Drive up on taper 1:30 <sup>1)</sup>				Check value of radial clearance after mounting		
		CN (normal)		C3		C4				Shaft		Sleeve		Shaft		Sleeve		min	max	min
		min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
24	30	0.03	0.04	0.04	0.055	0.055	0.075	0.015	0.02	0.3	0.35	0.3	0.4	-	-	-	-	0.015	0.02	0.035
30	40	0.035	0.05	0.05	0.065	0.065	0.085	0.02	0.025	0.35	0.4	0.35	0.45	-	-	-	-	0.015	0.025	0.04
40	50	0.045	0.06	0.06	0.08	0.08	0.1	0.025	0.03	0.4	0.45	0.45	0.5	-	-	-	-	0.02	0.03	0.05
50	65	0.055	0.075	0.075	0.095	0.095	0.12	0.03	0.04	0.45	0.6	0.5	0.7	-	-	-	-	0.025	0.035	0.055
65	80	0.07	0.095	0.095	0.12	0.12	0.15	0.04	0.05	0.6	0.75	0.7	0.85	-	-	-	-	0.025	0.04	0.07
80	100	0.08	0.11	0.11	0.14	0.14	0.18	0.045	0.06	0.7	0.9	0.75	1	1.7	2.2	1.8	2.4	0.035	0.05	0.08
100	120	0.1	0.135	0.135	0.17	0.17	0.22	0.05	0.07	0.7	1.1	0.8	1.2	1.9	2.7	2	2.8	0.05	0.065	0.1
120	140	0.12	0.16	0.16	0.2	0.2	0.26	0.065	0.09	1.1	1.4	1.2	1.5	2.7	3.5	2.8	3.6	0.055	0.08	0.11
140	160	0.13	0.18	0.18	0.23	0.23	0.3	0.075	0.1	1.2	1.6	1.3	1.7	3	4	3.1	4.2	0.055	0.09	0.13
160	180	0.14	0.2	0.2	0.26	0.26	0.34	0.08	0.11	1.3	1.7	1.4	1.9	3.2	4.2	3.3	4.6	0.06	0.1	0.15
180	200	0.16	0.22	0.22	0.29	0.29	0.37	0.09	0.13	1.4	2	1.5	2.2	3.5	4.5	3.6	5	0.07	0.1	0.16
200	225	0.18	0.25	0.25	0.32	0.32	0.41	0.1	0.14	1.6	2.2	1.7	2.4	4	5.5	4.2	5.7	0.08	0.12	0.18
225	250	0.2	0.27	0.27	0.35	0.35	0.45	0.11	0.15	1.7	2.4	1.8	2.6	4.2	6	4.6	6.2	0.09	0.13	0.2
250	280	0.22	0.3	0.3	0.39	0.39	0.49	0.12	0.17	1.9	2.6	2	2.9	4.7	6.7	4.8	6.9	0.1	0.14	0.22
280	315	0.24	0.33	0.33	0.43	0.43	0.54	0.13	0.19	2	3	2.2	3.2	5	7.5	5.2	7.7	0.11	0.15	0.24
315	355	0.27	0.36	0.36	0.47	0.47	0.59	0.15	0.21	2.4	3.4	2.6	3.6	6	8.2	6.2	8.4	0.12	0.17	0.26
355	400	0.3	0.4	0.4	0.52	0.52	0.65	0.17	0.23	2.6	3.6	2.9	3.9	6.5	9	5.8	9.2	0.13	0.19	0.29
400	450	0.33	0.44	0.44	0.57	0.57	0.72	0.2	0.26	3.1	4.1	3.4	4.4	7.7	10	8	10.4	0.13	0.2	0.31
450	500	0.37	0.49	0.49	0.63	0.63	0.79	0.21	0.28	3.3	4.4	3.6	4.8	8.2	11	8.4	11.2	0.16	0.23	0.35
500	560	0.41	0.54	0.54	0.68	0.68	0.87	0.24	0.32	3.7	5	4.1	5.4	9.2	12.5	9.6	12.8	0.17	0.25	0.36
560	630	0.46	0.6	0.6	0.76	0.76	0.98	0.26	0.35	4	5.4	4.4	5.9	10	13.5	10.4	14	0.2	0.29	0.41
630	710	0.51	0.67	0.67	0.85	0.85	1.09	0.3	0.4	4.6	6.2	5.1	6.8	11.5	15.5	12	16	0.21	0.31	0.45
710	800	0.57	0.75	0.75	0.96	0.96	1.22	0.34	0.45	5.3	7	5.8	7.6	13.3	17.5	13.6	18	0.23	0.35	0.51
800	900	0.64	0.84	0.84	1.07	1.07	1.37	0.37	0.5	5.7	7.8	6.3	8.5	14.3	19.5	14.8	20	0.27	0.39	0.57
900	1000	0.71	0.93	0.93	1.19	1.19	1.52	0.41	0.55	6.3	8.5	7	9.4	15.8	21	16.4	22	0.3	0.43	0.64
1000	1120	0.78	1.02	1.02	1.3	1.3	1.65	0.45	0.6	6.8	9	7.6	10.2	17	23	18	24	0.32	0.48	0.7
1120	1250	0.86	1.12	1.12	1.42	1.42	1.8	0.49	0.65	7.4	9.8	8.3	11	18.5	25	19.6	26	0.34	0.54	0.77
1250	1400	0.94	1.22	1.22	1.55	1.55	1.96	0.55	0.72	8.3	10.8	9.3	12.1	21	27	22.2	28.3	0.36	0.59	0.84
1400	1600	1.06	1.38	1.38	1.75	1.75	2.2	0.62	0.81	9.3	12.2	10.6	13.8	23.6	30.8	24.8	32.4	0.44	0.66	0.94
1600	1800	1.18	1.54	1.54	1.95	1.95	2.5	0.69	0.93	10.4	14	11.7	15.8	26.2	35.3	27.6	37.2	0.48	0.73	1.02
1800	2000	1.31	1.71	1.71	2.15	2.15	2.75	0.77	1.04	11.6	15.6	13.1	17.7	29.3	39.5	30.8	41.6	0.54	0.81	1.11
2000	2250	1.45	1.9	1.9	2.4	2.4	3.05	0.85	1.15	12.7	17.2	14.5	19.5	32.4	43.9	34	46	0.6	0.95	1.55
2250	2500	1.6	2.1	2.1	2.65	2.65	3.35	0.95	1.28	14.3	19.2	16.2	21.8	36.2	48.8	38	51.2	0.65	1.15	1.7

<sup>1)</sup> Applies only to solid steel shafts and hollow shafts whose bore is not larger than half the shaft diameter.

Note: Bearings whose radial clearance is in the upper half of the tolerance range prior to mounting, are mounted with the larger value of radial clearance reduction or axial drive-up. Bearings in the lower half of the tolerance range are mounted with the smaller value of the radial clearance reduction or axial drive up.

# RADIAL CLEARANCE REDUCTION FOR FAG CYLINDRICAL ROLLER BEARINGS WITH A TAPERED BORE

Nominal bore diameter		Radial clearance prior to mounting						Radial clearance reduction <sup>1)</sup>		Drive up on taper 1:12 <sup>1)</sup>				Check value of radial clearance after mounting		
d over mm	to	Clearance group						min mm	max	Shaft min mm	max	Sleeve		CN min mm	C3 min	C4 min
		CN (normal) min mm	max	C3 min	max	C4 min	max					min	max			
24	30	0.035	0.06	0.045	0.07	0.055	0.08	0.015	0.02	0.3	0.35	0.3	0.4	0.02	0.025	0.035
30	40	0.04	0.065	0.055	0.08	0.07	0.095	0.02	0.025	0.35	0.4	0.35	0.45	0.02	0.025	0.04
40	50	0.045	0.075	0.06	0.09	0.075	0.105	0.025	0.03	0.4	0.45	0.45	0.5	0.02	0.03	0.045
50	65	0.05	0.08	0.07	0.1	0.09	0.12	0.03	0.035	0.45	0.55	0.5	0.65	0.02	0.035	0.05
65	80	0.06	0.095	0.085	0.12	0.11	0.145	0.035	0.04	0.55	0.6	0.65	0.7	0.025	0.04	0.07
80	100	0.07	0.105	0.095	0.13	0.12	0.155	0.04	0.045	0.6	0.7	0.65	0.8	0.03	0.05	0.075
100	120	0.09	0.13	0.115	0.155	0.14	0.18	0.045	0.055	0.7	0.85	0.8	0.95	0.045	0.065	0.085
120	140	0.1	0.145	0.13	0.175	0.16	0.205	0.055	0.065	0.85	1	0.95	1.1	0.045	0.07	0.095
140	160	0.11	0.16	0.145	0.195	0.18	0.23	0.06	0.075	0.9	1.2	1	1.3	0.05	0.075	0.105
160	180	0.125	0.175	0.16	0.21	0.195	0.245	0.065	0.085	1	1.3	1.1	1.5	0.06	0.08	0.11
180	200	0.14	0.195	0.18	0.235	0.22	0.275	0.075	0.095	1.2	1.5	1.3	1.7	0.065	0.09	0.125
200	225	0.155	0.215	0.2	0.26	0.245	0.305	0.085	0.105	1.3	1.6	1.4	1.8	0.07	0.1	0.14
225	250	0.17	0.235	0.22	0.285	0.27	0.335	0.095	0.115	1.5	1.8	1.6	2	0.075	0.105	0.155
250	280	0.185	0.255	0.24	0.31	0.295	0.365	0.105	0.125	1.6	2	1.7	2.3	0.08	0.125	0.17
280	315	0.205	0.28	0.265	0.34	0.325	0.4	0.115	0.14	1.8	2.2	1.9	2.4	0.09	0.13	0.185
315	355	0.225	0.305	0.29	0.37	0.355	0.435	0.13	0.16	2	2.5	2.2	2.7	0.095	0.14	0.195
355	400	0.255	0.345	0.33	0.42	0.405	0.495	0.14	0.17	2.2	2.6	2.5	2.9	0.115	0.165	0.235
400	450	0.285	0.385	0.37	0.47	0.455	0.555	0.15	0.185	2.3	2.8	2.6	3.1	0.135	0.19	0.27
450	500	0.315	0.425	0.41	0.52	0.505	0.615	0.16	0.195	2.5	3	2.8	3.4	0.155	0.215	0.31
500	560	0.35	0.47	0.455	0.575	0.56	0.68	0.17	0.215	2.7	3.4	3.1	3.8	0.18	0.24	0.345
560	630	0.38	0.5	0.5	0.62	0.62	0.74	0.185	0.24	2.9	3.7	3.5	4.2	0.195	0.26	0.38
630	710	0.435	0.575	0.565	0.705	0.695	0.835	0.2	0.26	3.1	4.1	3.6	4.7	0.235	0.305	0.435
710	800	0.485	0.645	0.63	0.79	0.775	0.935	0.22	0.28	3.4	4.4	3.9	5.3	0.26	0.35	0.495
800	900	0.54	0.71	0.7	0.87	0.86	1.03	0.24	0.31	3.7	4.8	4.3	5.5	0.3	0.39	0.55
900	1000	0.6	0.79	0.78	0.97	0.96	1.15	0.26	0.34	4.1	5.3	4.8	6.2	0.34	0.44	0.62
1000	1120	0.665	0.875	0.865	1.075	1.065	1.275	0.28	0.37	4.4	5.8	5.2	7	0.385	0.5	0.7
1120	1250	0.73	0.97	0.96	1.2	1.2	1.44	0.31	0.41	4.8	6.4	5.7	7.6	0.42	0.55	0.79
1250	1400	0.81	1.07	1.07	1.33	1.33	1.59	0.34	0.45	5.3	7	6.3	8.3	0.47	0.62	0.85

1) Applies only to solid steel shafts and hollow shafts whose bore is not larger than half the shaft diameter.

Note: Bearings whose radial clearance is in the upper half of the tolerance range prior to mounting, are mounted with the larger value of radial clearance reduction or axial drive-up. Bearings in the lower half of the tolerance range are mounted with the smaller value of the radial clearance reduction or axial drive up.



## HYDRAULIC NUTS WITH A DISPLACEMENT MEASURING INSTRUMENT

If, due to poor accessibility of the bearing location, the radial clearance measurement with a feeler gauge described on page 12 is not possible, the axial drive up of the bearing on the tapered seat can be measured instead. For this purpose a measuring instrument can be screwed to the face of the hydraulic nut, fig. 14.

If the axial hole  $G\ 1/4$  in the hydraulic nut is occupied by the pump, users can produce the second axial hole required for the measuring instrument themselves. On request FAG also supply hydraulic nuts, suffixed .2A, that already feature such a hole, fig. 1. Order example: **RKP200.2A**

First, the bearing has to be placed on the shaft. The required oil pressure is determined by the bearing size and by the number of contact areas and is indicated in the operating instructions. Then the dial gauge must be adjusted to zero. The bearing is driven up the shaft by pumping until the specified drive up has been achieved.

Which of the metering needles supplied has to be selected for which application is also specified in the detailed operating instructions that come with every measuring instrument.

Order designation: **RKP.MG**

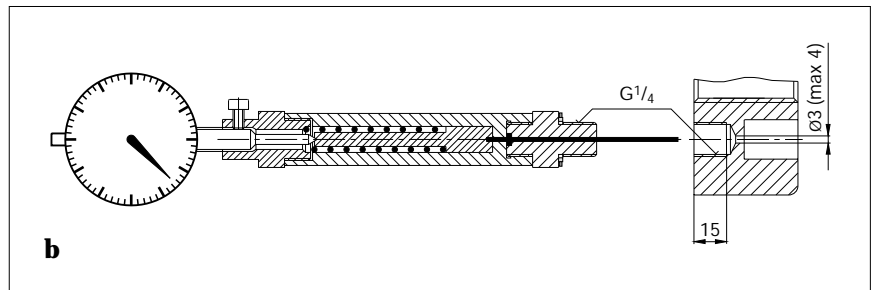
1 displacement measuring instrument with dial gauge,  
2 metering needles 62 mm long,  
2 metering needles 70 mm long,

2 metering needles 100 mm long,  
2 Usit rings,

2 O-rings,  
1 plastic case with lining



**a**



**b**



**c**

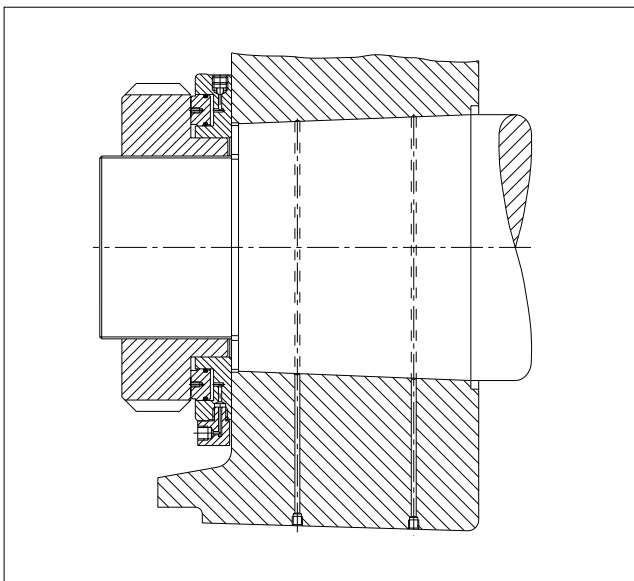
**14a to c: Displacement measuring instrument RKP.MG**

## GENERAL MOUNTING AIDS FOR THE HYDRAULIC PROCEDURE

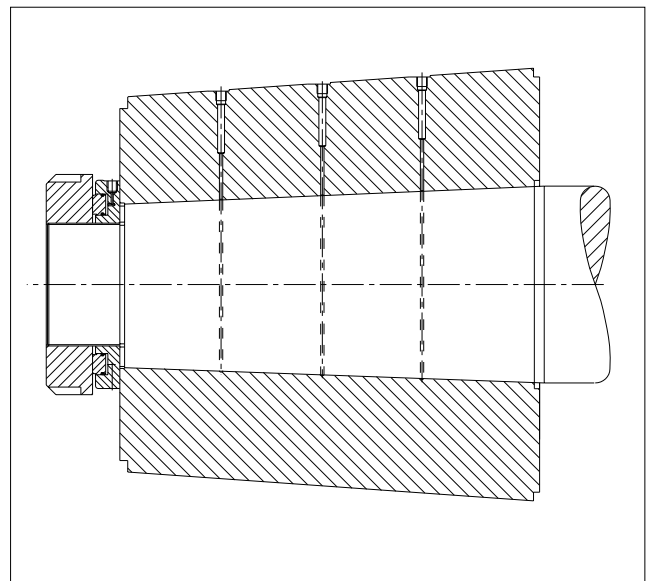
FAG hydraulic nuts are not only suitable for bearing mounting. They can also be used for other press-fitted assemblies (e.g. gearwheels, drive wheels and cou-

plings). Considerable drive-up forces are also often required in general machine construction, and especially in shipbuilding. Such forces can be economically ap-

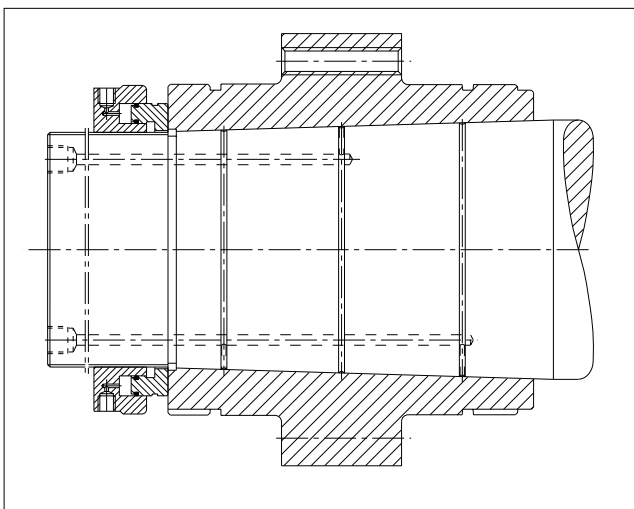
plied by means of hydraulic nuts. Figs. 15 to 18 show examples of parts mounted by the hydraulic method.



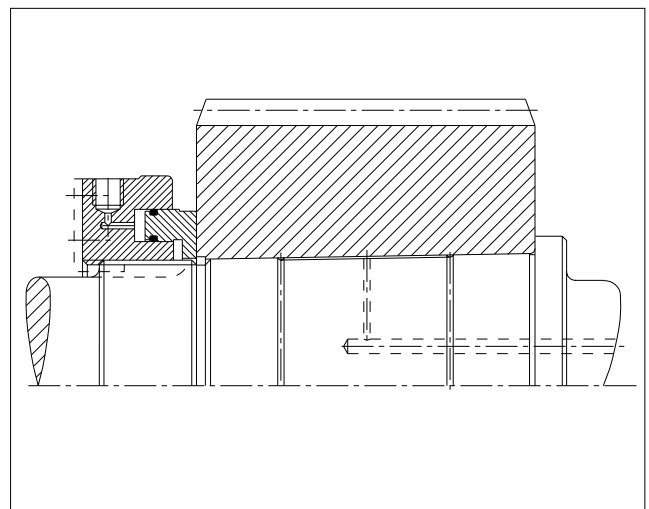
**15: Press-fitting a rudder on a rudder shaft**



**16: A propeller press-fitted on a ship shaft with a hydraulic nut.**



**17: Mounting of a coupling**



**18: Mounting a gearwheel with a hydraulic nut**

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