K • W • M

Bushing System

The KWM Bushing System comprises KWM Bushes in conjunction with special Reamers and Bushing Tools for the rational repair of worn out pivot bearings in watches and clocks of all kinds, meters, time switches, taxi-meters, pressure gauges, and many other industrial movements.

The KWM Bushing System has met with worldwide success over the years in repair workshops, factories, electrical and industrial undertakings. Many millions of KWM Bushes – manufactured on modern precision lathes – are being used in many countries of the world every year.

KWM Bushes should be used for rational repair work in every workshop. The acquisition of the KWM Bushing unit is to be recommended in all cases because only then can full use be made of all the advantages of the KWM Bushing System. By using the special Reamers to obtain a good press-fitting of the Bush and by using the manual Reamer holder it is possible to start even without the KWM Bushing Tool because the versatility of the System and the assortments offered based on the standard-unit principle also permit a gradual build-up of equipment.

Elma

Precisions-Engineering

7700 Singen (Hohentwiel) Western Germany

The KWM Bushing System covers all non-jewelled bearings from the wirst watch up to the grandfather clock.

In most watches and clocks the pivots run in bearings which are drilled directly into the plates. Plates as a bearing material have however the disadvantage that the grain of the brass runs in metal rolling direction and the stress in the hole can be unfavourably related to grain direction. In this case the bearing can wear out relatively quickly.

In contrast to this with turned KWM Bushes the grain runs in axial direction, so that the material is more resistant to pivot pressure. The press-in bush is therefore much superior to the usual plate bearing.

The life span of a bush depends essentially on the quality and type of pivot. It is useless to replace a worn-out bearing by a KWM bush if the pivot is not at the same time ground polished. If this is not done the new bush will soon wear out again in spite of its high quality.

Since KWM Bushes are fully finished and need not be bored out – for each pivot there is a corresponding bush size – the cylindrical pivots also rotate in a cylindrical bore. The pivots are therefore supported over their entire length (Fig. 1), so that KWM Bushes as bearings are less prone to repair (Fig. 2 shows a bearing which has been broached out by a conical reamer).

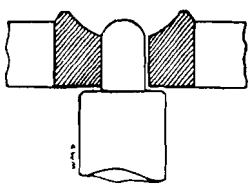


Fig. 1

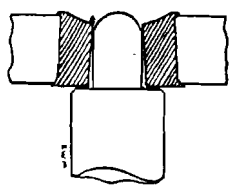


Fig. 2

KWM Bushes "L" should be 2-3/100th mm. higher than the plate so that a deeper oil recess permits improved oil retention. This prevents any escaping of the oil. (Fig. 1).

With KWM Bushes you save time and money and improve the quality of your repair work.

Bushes in sizes not given in tables L, C and KL and Bushes made of other materials can be manufactured to pattern or drawing.

Instructions for using KWM Bushes in industry:

The use of KWM Bushes for the manufacture of clocks and technical instruments of all kinds is rational and advantageous for the following reasons:

1) The bearings do not tend to wear out because the axial pressure is withstood better by the axial run of the grain than is the case with bearings drilled into the plate the grain of which runs in one direction alone.

2) For press-in bushes a material can thus be selected with more favourable bearing properties than those offered by brass plates, i.e. plastic or a material other than brass can be used for the plates. This permits reduction of costs.

3) By using press-in bushes holes in the plates to take the bearings can be punched. This is simpler and cheaper than drilling different holes of small diameter.

Press-in Bushes are made for industrial use also in dimensions, tolerances, metals and alloys which may lie outside the assortments shown in tables L, C and KL.

Assortments of the KWM Bushing System:

I. (K·W·M) **Bushes for clocks** (travel, miniature, alarm, mantel, wall, bracket and long-case clocks, meters, timers, taxi-meters, pressure gauges, etc.) in a standard assortment of 147 different dimensions.
Index: "L" (see table "L").
Supplied in basic and supplementary assortments in wooden boxes
in miniature assortments I-X, 100 bearings each
in refill packs of 20 items each.

II. (K·W·M) **calibrated Bushes in original dimensions for miniature and travel clocks.**
Index: "C" (see table "C").
Supplied in 2 assortments each containing 25 plastic tubes with 80 of the most important bushes for clocks of the following makes, KIENZLE, KAISER, EUROPA, JUNGHANS, KOHLER, SCHATZ, MAUTHE and in loose and refill packs containing 10 items.

III. (K·W·M) **Watch Bushes for pocket and wrist watches** in a standard assortment of 100 different dimensions.
Index: "KL" (see table "KL").
Supplied in 4 assortments each containing 25 plastic tubes with 75 Bushes in refill packs containing 10 items each.
KWM Watch Bushes are fitted like jewels with any standard **jewelling** tool.

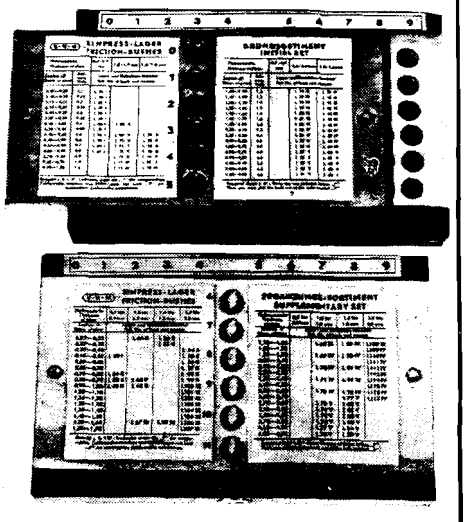
IV. **The** (K·W·M) **pivot gauge** for measuring pivots and selecting the correct bush and the appropriate reamer (only for KWM Bushes "L").

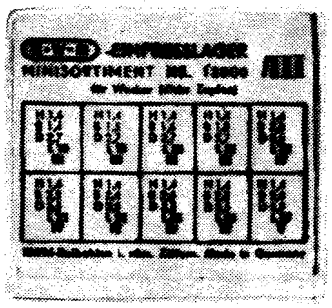
V. **Bushing Tools for the KWM Bushes "L"** (KWM Reamers, Chamfering Cutters, and Reamer Holders) for use without the KWM Bushing Tool.

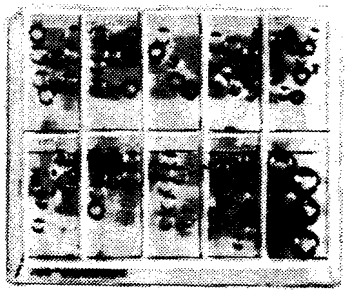
VI. **The (K·W·M) Bushing Tool for KWM Bushes "L"** for broaching the worn-out bearing in order to provide the exact seating to receive the KWM Bush.

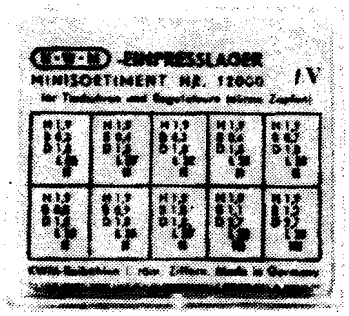
VII. **The (K·W·M) Complete outfit includes KWM Bushes "L"** (large assortment in 2 cabinets), KWM Bushing Tool, KWM Pivot Gauge, all on a portable workbase.

VIII. **Additional tools for the KWM Bushing Tool.** The KWM working base, the equipment for the removal and fitting of conical clock balance staffs.

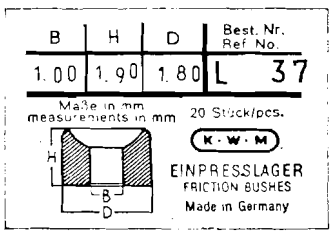
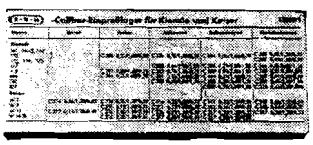
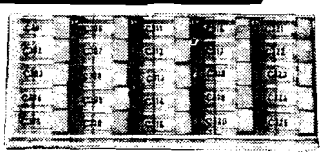
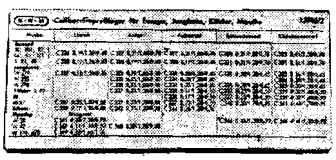
	Ref. No.	Description	Measures and Weights
		**I. (K·W·M) Bushes for Clocks** KWM Assortments of bushes in wooden cabinets (see table "L")	
	12000a	**Basic Assortment** contains 10 bushes each of the most used dimensions L 01 to L 59 in KWM Storage Cabinet. Contents: **590 Bushes**	190 x 120 x 20 mm 320 g
	12000b	**Supplementary Assortment,** completes the Basic Assortment with 10 bushes each L 60 to L 117 in KWM Storage Cabinet. Contents: **580 Bushes**	190 x 120 x 20 mm 335 g
	12000c	**Complete Assortment,** consists of the Basic and Supplementary Assortments with 2 Storage Cabinets with 10 bushes each L 01 to L 117. Contents: **1170 Bushes**	655 g
		KWM Minor Assortments of Bushes in plastic boxes (see table "L"). Contents: **100 Bushes each**	
	12000/1	**KWM Mini assortment for miniature clocks and small alarm clocks,** 10 dimensions each = 100 pieces in sliding unit box, pivot diameters. 15-0.7 mm, height 1.0 mm. L 56, 01, 57, 02, 58, 03, 59, 04, 05, 06	65 x 55 x 15 mm 21.5 g

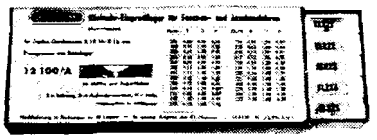
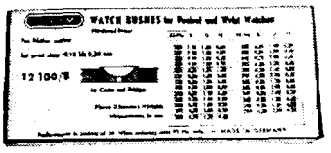
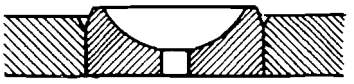
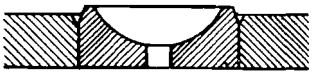
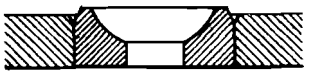
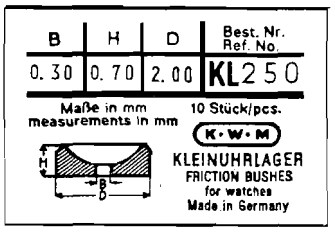
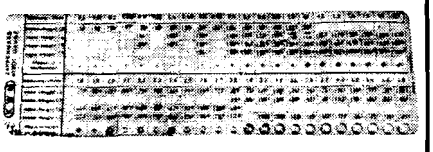


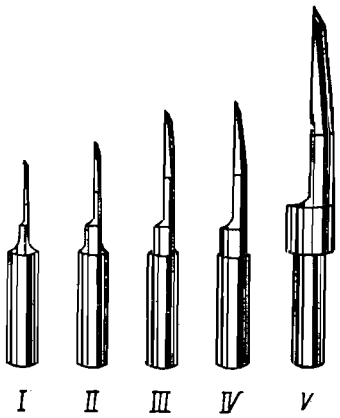
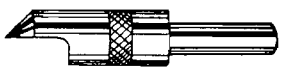
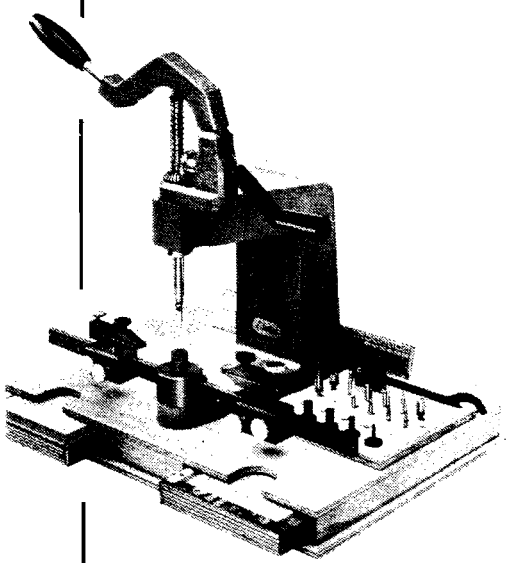




Ref. No.	Description	Measures and Weights
12000/II	**KWM Minor Assortments . . .** **For alarm clocks with thin pivots.** Pivot diameters 0.4 to 1.3 mm, height 1.4 mm 10 bushes each L 09, 10, 11, 12, 13, 14, 15, 16, 17	26 g
12000/III	**For alarm clocks with thick pivots.** Pivot diameters 1.4 to 3 mm, height 1.4 mm. 10 bushes each L 18, 19, 20, 21, 22, 23, 24, 25, 26, 27	29 g
12000/IV	**For centre wheels and barrel arbors of alarm clocks.** Pivot diameters 3.2 to 4.8 mm, height 1.4 and 1.7 mm. 10 bushes each L 28, 29, 30, 31, 81, 82, 83, 84, 54, 85	39 g
12000/V	**For mantel clocks and wall clocks with thin pivots.** Pivot diameters 0.3 to 1.2 mm, height 1.9 mm. 10 bushes each L 86, 87, 32, 34, 35, 36, 37, 38, 39	26 g
12000/VI	**For mantel clocks and wall clocks with thick pivots.** Pivot diameters 1.3 to 2.8 mm, height 1.9 mm. 10 bushes each L 40, 41, 42, 43, 44, 45, 46, 47, 48, 49	29 g
12000/VII	**For grandfather clocks and wall clocks with thin pivots.** Pivot diameters. 0.5 to 2 mm, height 2.7 mm. 10 bushes each L 94, 95, 96, 98, 99, 101, 103, 105, 107, 109	28 g
	The following KWM Minor Assortments do not form part of the Basic or Supplementary Assortments and must be purchased additionally if required:	
12000/VIII	**For wall clocks and grandfather clocks with thick pivots.** Pivot diameters 3 to 4.8 mm, height 2.7 mm. 10 bushes each L 118, 119, 120, 121, 122, 123, 124, 125, 126, 127	55 g
12000/IX	**For centre wheels and barrel arbors of grandfather clocks and industrial movements.** Pivot diameters 5 to 6.8 mm, height 3 and 4 mm, outside diameter 8.7 mm **(Special Reamer VI required)** total 46 bushes L 128, 129, 130, 131, 132, 133, 134, 135, 136, 137	59 g
12000/X	**For alarms and clocks (intermediate sizes)** bushes with extra thin walls. Pivot diameters 2.9 to 3.6 mm, height 1.4 and 2.7 mm. Outside diameter 4.7 mm **(Special Reamer IVa required).** 10 bushes each L 138, 139, 140, 141, 142, 143, 144, 145, 146, 147	36 g

	Ref. No.	Description	Measures and Weights
		K.W.M. Bushes in packs	
	12000	**L 01 to L 117,** 20 pieces in hermetically sealed cellophane packets	
		L 118 to L 127, 20 pieces in hermetically sealed cellophane packets	
		**L 128 to L 137,** 10 pieces in hermetically sealed cellophane packets	
		L 138 to L 147, 20 pieces in hermetically sealed cellophane packets	
	12001	**K.W.M. Storage Cabinets, empty for Basic Assortments** (for the ideal storage of existing bushes or KWM Minor Assortments)	190 x 120 x 25 mm 305 g
	12001a	**K.W.M. Storage Cabinets, empty, for Supplementary Assortments**	305 g
  		**II. (K·W·M) -Calibrated Bushes in original dimensions for miniature and travel alarms** (see table "C") These are fitted by means of any Jewelling Press with the appropriate reamers.	
	12500/1	**K.W.M. Assortment of Calibrated Bushes** in plastic box, contains 80 press-in bushes for KIENZLE and KAISER (C 301 to C 317)	130 x 54 x 15 mm 50 g
	12500/2	**K.W.M. Assortment of Calibrated Bushes** in plastic box, contains 80 press-in bushes for EUROPA, JUNGHANS, KÖHLER, SCHATZ, MAUTHE (C 326 to C 349)	50 g
	12500	**K.W.M. Calibrated Bushes in packs C 301 to 317, C 326 to 341, C 343 to 349** 10 pieces in hermetically sealed cellophane packets	

	Ref. No.	Description	Measures and Weights
 		**III. (K·W·M) Bushes for pocket and wrist watches** (see table "KL") Can be fitted with any jewelling Press using the appropriate reamer.	
	12100 A	**KWM Watch Assortment A (for plates and pallet cocks)** pivot diameters 0.1 to 0.16 mm, 3 bushes of each size KL 201- 225, in plastic boxes in slide-in units, contents: **75 bushes**	130 x 54 x 15 mm 50 g
 A			
	12100 B	**KWM Watch Assortment B (for Cocks and bridges),** pivot diameters 0.18-0.30 mm, 3 bushes of each size KL 226-250	50 g
 B			
	12100 C	**KWM Watch Assortment C (for upper centre wheel bearings),** Pivot diameters 0.35-1.00 mm, 3 bushes of each size KL 251-275	50 g
 C			
	12100 D	**KWM Watch Assortment D (for lower centre wheel bearings),** particularly thin-walled for dial side, pin diameters 0.35-1.10 mm, 18 dimensions, 3 bushes each KL 276-291 **and**	
 D		**9 different sizes of Chatons (brass bushes)** for the use of standard size jewels when the hole is defective or must be enlarged, for jewel diameters 0.8-1.40 mm, 3 bushes each size KL 292-300	50 g
			
		**KWM Watch bushes in loose and refill packs**	
	12100	KL 201 to KL 300, 10 pieces in hermatically sealed cellophane packets	
		IV. (K·W·M) Pivot gauge for KWM Bushes "L"	
	12002	**KWM Pivot gauge** for measuring polished pivots and selection of correct bush and reamer	223×67 mm 83 g

	Ref. No.	Description	Measures and Weights
		**V. Bushing equipment for KWM Bushes "L"**	
	12003 S	**KWM Reamers I to V** with screw for use in conjunction with Hand Reamer Holder, set of 5 pieces	11 g
	12003 S	**KWM Reamers, single I to V** ditto, IVa for bushes L 138 to L 147 of Minor Assortment X	
		ditto, VI for bushes L 128 to L 137 of Minor Assortment IX	
	12004 S	**Chamfering Cutter** with screw for use in conjunction with Hand Reamer Holder.	5 g
		Reamers and Chamfering Cutters can also be supplied **without side screws** if they are to be used in KWM Bushing Tools incorporating a Jacob Chuck, in Pin Vices, Drilling Machines, Collets etc. In these cases please delete prefix "S" when ordering	
	12005	**Hand Reamer Holder** for holding reamers and chamfering cutters when working without KWM Bushing Tool	25 g
		**VI. KWM Bushing tools for KWM Bushes "L"**	
	10	**KWM Universal Bushing Tool** with adjustable pressure operated handle and holding and centring device. Improved model. Standard Accessories: 1 set KWM Reamers I-V, 1 precision Jacob Chuck 0-4 mm, complete with key, 5 Anvils, 1 Chamfering Cutter, 5 Pushers, 1 Centring Point, 1 Drilling Plate, 1 Hook Key.	Height 360 mm Basic 365 mm Total 260 mm 5 kg
		Large KWM Bush Assortment No. 12000c KWM Pivot Gauge No. 12002 KWM Work Block No. 11	
	12210	Same tool as Order No. 10 but without: Large KWM Bush Assortment No. 12000c KWM Pivot Gauge No. 12002 KWM Work Block No. 11	

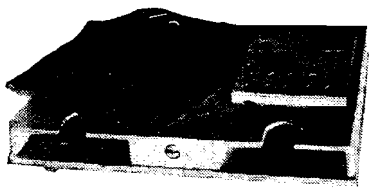
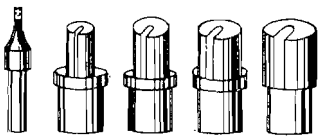
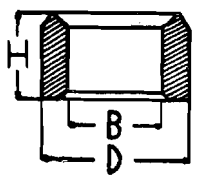
	Ref. No.	Description	Measures and Weights
 No. 11		**VII. (K·W·M) Supplementary tool**	
	11	**KWM Working Block with plastic cover,** facilitates the portable use of the KWM Bushing Tool and combines the bushing tool, the KWM Assortments of Bushes, the KWM Pivot Gauge and supplementary tools.	365 x 255 x 43 mm 1580 g
 No. 13	13	**Accessories for fitting of balance Staff of Alarm Clocks** 1 Pusher, 4 Stakes, permits easy replacement of balance staff in alarm clocks with no risk of damage	60 g

Table L

K•W•M **Bushes**

B = Bore D = Outside diameter RN = Reamer
H = Height R = Reamer ⌀ Z = Pivot ⌀

Z Z = Pivot ⌀	B Bore	H	1,0		1,4					1,7	1,9			2,7					3,0	4,0
		D	1,2	1,8	1,8	2,7	3,5	4,7	5,9	5,9	1,8	2,7	3,5	1,8	2,7	3,5	4,7	5,9	8,7	8,7
		R	1,18	1,78	1,78	2,69	3,48	4,66	5,85	5,85	1,78	2,69	3,48	1,78	2,69	3,48	4,66	5,85	8,64	8,64
		RN	I	II	II	III	IV	IVa	V	V	II	III	IV	II	III	IV	IVa	V	VI	VI
0,07—0,08	0,1		L 55																	
0,10—0,12	0,15		L 56																	
0,15—0,17	0,2		L 01																	
0,19—0,21	0,25		L 57																	
0,23—0,25	0,3		L 02		L 64						L 86									
0,27—0,30	0,35		L 58																	
0,32—0,35	0,4		L 03		L 08						L 87									
0,38—0,40	0,45		L 59																	
0,42—0,45	0,5		L 04		L 09						L 32			L 94						
0,48—0,50	0,55		L 60																	
0,53—0,55	0,6		L 05		L 10						L 33			L 95						
0,57—0,60	0,7		L 06		L 11						L 34			L 96						
0,65—0,70	0,8		L 07		L 12						L 35			L 97						
0,75—0,80	0,9			L 61	L 13						L 36			L 98						
0,85—0,90	1,0			L 62	L 65	L 14					L 37				L 99					
0,95—1,00	1,1			L 63	L 66	L 15						L 38			L 100					
1,05—1,10	1,2					L 16						L 39			L 101					
1,15—1,20	1,3					L 17						L 40			L 102					
1,25—1,30	1,4					L 18						L 41			L 103					
1,35—1,40	1,5					L 19						L 42			L 104					
1,45—1,50	1,6					L 20						L 43			L 105					
1,55—1,60	1,7					L 67						L 88			L 106					
1,65—1,70	1,8					L 21						L 44			L 107					
1,75—1,80	1,9					L 68						L 89			L 108					
1,85—1,90	2,0						L 22						L 45			L 109				
1,95—2,00	2,1						L 69						L 90			L 110				
2,05—2,10	2,2						L 23						L 46			L 111				
2,15—2,20	2,3						L 70						L 91			L 112				
2,25—2,30	2,4						L 24						L 47			L 113				
2,35—2,40	2,5						L 71						L 92			L 114				
2,45—2,50	2,6						L 25						L 48			L 115				
2,55—2,60	2,7						L 72						L 93			L 116				
2,65—2,70	2,8						L 26			L 79			L 49			L 117				
2,75—2,80	2,9							L 138	L 73	L 80							L 143			
2,85—2,90	3,0							L 139	L 27	L 50							L 144	L 118		
2,95—3,05	3,2							L 140	L 28	L 51							L 145	L 119		
3,10—3,25	3,4							L 141	L 74	L 81							L 146	L 120		
3,30—3,45	3,6							L 142	L 29	L 52							L 147	L 121		
3,55—3,65	3,8								L 75	L 82								L 122		
3,75—3,85	4,0								L 76	L 83								L 123		
3,90—4,05	4,2								L 30	L 53								L 124		
4,15—4,25	4,4								L 77	L 84								L 125		
4,35—4,45	4,6								L 31	L 54								L 126		
4,55—4,65	4,8								L 78	L 85								L 127		
4,75—4,85	5,0																		L 128	
5,00—5,05	5,2																		L 129	
5,15—5,25	5,4																		L 130	
5,35—5,45	5,6																		L 131	
5,55—5,65	5,8																		L 132	
5,75—5,85	6,0																		L 133	
5,95—6,05	6,2																			L 134
6,15—6,25	6,4																			L 135
6,35—6,45	6,6																			L 136
6,55—6,65	6,8																			L 137



All measurements in mm. Numbers at the intersections of columns B and D are the model numbers.

Assortments: Bushes L 01 to L 59 are contained in the initial assortment No. 12000a. Bushes L 60 to L 117 in supplementary assortment No. 12000b. Bushes L 118 to 127 are supplied **only** in KWM minor assortment No. 12000/VIII. Bushes L 128 to L 137 are supplied **only** in KWM minor assortment No. 12000/IX. Bushes L 138 to L 147 are supplied **only** in KWM minor assortment No. 12000/X.

Table KL

Dimensions and Assortment details

of (K·W·M) Bushes for pocket and wrist watches

B = Bore, D = Outside Diameter, H = Height. All measurements in millimeters.

Assortment No. 12100/A for pivot diameters 0.10 to 0.16 mm KL No. 201–225

KL.-Nr.	B	D	H	KL-Nr	B	D	H	KL-Nr.	B	D	H
201	0,10	0 80	0,25	209	0,12	1,00	0,35	217	0,14	1,00	0,35
202	0,10	1,00	0,35	210	0,12	1,20	0,40	218	0,14	1,20	0,40
203	0,10	1,20	0,40	211	0,12	1,40	0,50	219	0,14	1.40	0,50
204	0,11	0,80	0,25	212	0,12	1,80	0,70	220	0,14	1,80	0,70
205	0,11	1,00	0,35	213	0.13	1,00	0,35	221	0,16	1,00	0,35
206	0,11	1,20	0,40	214	0,13	1,20	0,40	222	0,16	1,20	0,40
207	0,11	1,40	0,50	215	0,13	1,40	0,50	223	0,16	1,40	0,50
208	0,12	0,80	0,25	216	0.13	1,80	0,70	224	0,16	1,80	0,70
								225	0,16	2.00	0,70

Assortment No. 12100/B for pivot diameters 0.18 to 0.30 mm KL No. 226–250

KL-Nr.	B	D	H	KL-Nr.	B	D	H	KL-Nr.	B	D	H
226	0,18	1,20	0,40	234	0,22	1,20	0,40	242	0,26	1,20	0,40
227	0,18	1,40	0,50	235	0,22	1,40	0,50	243	0,26	1,40	0,50
228	0,18	1,80	0,70	236	0,22	1,80	0,70	244	0,26	2,00	0,70
229	0.18	2,00	0,70	237	0,22	2,00	0,70	245	0,28	1,20	0,40
230	0,20	1,20	0,40	238	0,24	1.20	0.40	246	0 28	1,40	0.50
231	0.20	1,40	0,50	239	0,24	1,40	0,50	247	0 28	2,00	0,70
232	0,20	1,80	0.70	240	0,24	1,80	0 70	248	0,30	1,20	0,40
233	0,20	2,00	0.70	241	0,24	2,00	0,70	249	0.30	1,40	0,50
								250	0,30	2,00	0,70

Assortment No. 12100/C for upper centre wheel with pivot diameters 0.35 to 1.00 mm KL No. 251–275

KL-Nr.	B	D	H	KL-Nr.	B	D	H	KL-Nr.	B	D	H
251	0,35	1,20	0,40	259	0,55	1,20	0,40	267	0,75	2,00	0,70
252	0,35	1,60	0,60	260	0,55	1,60	0,60	268	0,80	1,80	0,70
553	0,40	1,40	0,50	261	0,60	1,40	0,50	269	0,80	3,00	0,80
554	0,40	1,80	0.70	262	0 60	2 60	0,80	270	0.85	2.00	0,70
255	0,45	1.20	0,40	263	0,65	1,60	0,60	271	0,90	2,30	0,80
256	0.45	1.60	0,60	264	0,65	2,00	0.70	272	0,90	3,00	0.80
257	0,50	1,40	0,50	265	0,70	1 80	0,70	273	0,95	2,60	0,80
258	0,50	1,80	0,70	266	0,70	2,30	0,80	274	1,00	2,30	0,80
								275	1,00	3,00	0,80

Assortment No. 12100/D for lower centre wheels with pivot diameters 0.35 to 1.10 mm KL No. 276–291

and **Chatons for jewel** diameters 0.80 to 1.40 mm KL No. 292–300

KL-Nr.	B	D	H	KL-Nr.	B	D	H	KL-Nr.	B	D	H
for lower centre wheel								**Chatons**			
276	0,35	0,70	0,50	284	0,75	1,20	0,70	292	0,79	1,40	0,50
277	0,40	0,80	0,50	285	0,80	1,20	0,70	293	0,79	1,60	0,60
278	0,45	0,80	0,50	286	0,85	1,30	0,80	294	0,99	1,40	0,50
279	0,50	0.90	0,50	287	0,90	1,30	0,80	295	0.99	1,60	0.60
280	0,55	1,00	0,60	288	0,95	1,40	0,80	296	0,99	1,80	0,70
281	0,60	1.00	0,60	289	1,00	1,40	0,80	297	1,19	2,00	0,70
282	0,65	1,10	0,60	290	1,05	1:50	0,90	298	1,19	2,30	0,80
283	0,70	1,10	0,60	291	1,10	1,50	0,90	299	1,39	2.60	0,80
								300	1,39	3,00	0,80

Table C

(K·W·M) calibrated bushes to original dimensions

Make	Balance	Pallet	Escape wheel	Fourth wheel	Third wheel
					Ref. No. 12500/1.
Kienzle					
161, 161/5, 162, 172, 173, 174, 175		C 301 0,21/1,60/0,50	C 301 0,21/1,60/0,50	C 304 0,31/1,60/0,75	C 306 0,41/1,20/0,75 C 307 0,41/1,60/0,70
412			C 303 0,26/2,00/1,20	C 305 0,31/2,00/1,20	C 308 0,41/2,00/1,20
413		C 302 0,26/1,60/0,75	C 302 0,26/1,60/0,75	C 309 0,51/2,00/1,00	C 310 0,61/2,00/,095
606		C 301 0,21/1,60/0,50	C 301 0,21/1,60/0,50	C 304 0,31/1,60/0,75	C 307 0,41/1,60/0,70
702			C 303 0,26/2,00/1,20	C 305 0,31/2,00/1,20	C 308 0,41/2,00/1,20
837				C 309 0,51/2,00/1,00	C 310 0,61/2,00/,[illegible]
Kaiser					
W 7	C 314 0,16/1,20/0,43	C 316 0,25/1,20/0,53	C 316 0,25/1,20/0,53	C 317 0,32/1,20/0,53	C 317 0,32/1,20/0,53
W 9		C 311 0,12/1,00/0,32 C 315 0,19/1,00/0,32 (Mittelsekunde)	C 311 0,12/1,00/0,32	C 313 0,16/1,00/0,32	C 313 0,16/1,00/0,32
W 13	C 312 0,14/1,20/0,40	C 316 0,25/1,20/0,53	C 316 0,25/1,20/0,53	C 317 0,32/1,20/0,53	C 317 0,32/1,20/0,53
W 16 B		C 316 0,25/1,20/0,53	C 317 0,32/1,20/0,53	C 317 0,32/1,20/0,53	
Europa					**Ref. No. 12500/2**
00, 001, 02, 04, 51, 101	C 326 0,19/1,20/0,40	C 327 0,21/1,60/0,70	C 327 0,21/1,60/0,70	C 328 0,31/2,00/0,70	C 329 0,41/2,50/0,70
8, 81, 88	C 330 0,17/1,20/0,40	C 330 0,17/1,20/0,40	C 330 0,17/1,20/0,40	C 331 0,31/1,20/0,70	C 331 0,31/1,20/0,70
Junghans					
W 279	C 332 0,12/1,20/0,35	C 333 0,21/1,00/0,40	C 334 0,25/1,20/0,60	C 335 0,30/1,20/0,65	C 335 0,30/1,20/0,65
W 285		C 333 0,21/1,00/0,40	C 334 0,25/1,20/0,60		C 336 0,38/1,20/0,60
W 290		C 333 0,21/1,00/0,40	C 334 0,25/1,20/0,60	C 335 0,30/1,20/0,65	C 335 0,30/1,20/0,65
Köhler					
E 70		C 337 0,23/1,20/0,50	C 338 0,17/1,20/0,50	C 337 0,23/1,20/0,50	C 339 0,32/1,60/0,70
80			C 338 0,17/1,20/0,50	C 337 0,23/1,20/0,50	C 339 0,32/1,60/0,[illegible]
40/51	C 337 0,23/1,20/0,50	C 337 0,23/1,20/0,50	C 337 0,23/1,20/0,50	C 340 0,33/1,70/0,95	C 341 0,43/1,70/0,95
Schatz	C 330 0,17/1,20/0,40	C 343 0,21/1,20/0,70	C 344 0,26/1,20/0,70		
Mauthe	Steigrad				
W 38	C 345 0,30/1,30/0,90			C 346 0,41/1,30/0,90	C 346 0,41/1,30/0,90
W 42	C 347 0,17/1,30/0,60	C 348 0,20/1,20/0,60			
W 370, 470	C 349 0,50/1,60/1,00				

Measurements in millimetres: Bore / Diameter / Height

Four new (K·W·M) Minor Assortments with 100 (K·W·M) Friction Bushes each in plastic boxes

KWM Minor Assortment No. 12 000/III a - for alarm clocks (thick pivots - supplement)
10 bushes each of following measurements:

H	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4
B	1,0	1,1	1,7	1,9	2,1	2,3	2,5	2,7	2,9	3,0
D	1,8	1,8	2,7	2,7	3,5	3,5	3,5	3,5	5,9	5,9
	L 65	L 66	L 67	L 68	L 69	L 70	L 71	L 72	L 73	L 27
	II	II	Iil	III	IV	IV	IV	IV	V	V

KWM Minor Assortment No. 12 000/IV a - for centre wheels and barrel arbos for alarm clocks (supplement)
10 bushes each of following measurements:

H	1,4	1,4	1,4	1,4	1,4	1,7	1,7	1,7	1,7	1,7
B	3,4	3,8	4,0	4,4	4,8	2,8	3,0	3,2	3,6	4,2
D	5,9	5,9	5,9	5,9	5,9	5,9	5,9	5,9	5,9	5,9
L	L 74	L 75	L 76	L 77	L 78	L 79	L 50	L 51	L 52	L 53
R	V	V	V	V	V	V	V	V	V	V

KWM Minor Assortment No.12 000/VI a - for mantle clocks and wall clocks (thick pivots - supplement)
10 bushes each of following measurements:

H	1,9	1,9	1,9	1,9	1,9	1,9	2,7	2,7	2,7	2,7
B	1,7	1,9	2.1	2,3	2,5	2,7	0,9	1,1	1,3	1,5
D	2,7	2,7	2,7	2,7	2,7	2,7	1,8	2,7	2,7	2,7
L	L 88	L 89	L 90	L 91	L 92	L 93	L 98	L 100	L 102	L 104
R	III	III	III	III	III	III	II	III	III	III

KWM Minor Assortment No. 12 000/VII a - for wall clocks and grandfather clocks (medium pivots)
10 bushes each of following measurements:

H	2,7	2,7	2,7	2,7	2,7	2,7	2,7	2,7	2,7	2,7
B	1,7	1,9	2,1	2.2	2,3	2,4	2,5	2,6	2,7	2,8
D	2,7	2,7	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
L	L 106	L 107	L 110	L 111	L 112	L 113	L 114	L 115	L 116	L 117
R	III	III	IV	IV	IV	IV	IV	IV	IV	IV

H — Height B = Bore D = Diameter L = Bush number R = Reamer

Complete table of KWM Friction Bushes

B	H	D	KWM-No.	S	RA
0,10	0,25	0,80	KL 201	12100 A	
	0,35	1,00	KL 202	12100 A	
	0,40	1,20	KL 203	12100 A	
	1,00	1,20	L 55	12000/I	I
0,11	0,25	0,80	KL 204	12100 A	
	0,35	1,00	KL 205	12100 A	
	0,40	1,20	KL 206	12100 A	
	0,50	1,40	KL 207	12100 A	
0,12	0,25	0,80	KL 208	12100 A	
	0,32	1,00	C 311	12500/1	
	0,35	1,00	KL 209	12100 A	
	0,35	1,20	C 332	12500/2	
	0,40	1,20	KL 210	12100 A	
	0,50	1,40	KL 211	12100 A	
	0,70	1,80	KL 212	12100 A	
0,13	0,35	1,00	KL 213	12100 A	
	0,40	1,20	KL 214	12100 A	
	0,50	1,40	KL 215	12100 A	
	0,70	1,80	KL 216	12100 A	
0,14	0,35	1,00	KL 217	12100 A	
	0,40	1,20	KL 218	12100 A	
	0,40	1,20	C 312	12500/1	
	0,50	1,40	KL 219	12100 A	
	0,70	1,80	KL 220	12100 A	
0,15	1,00	1,20	L 56	12000/I	I
0,16	0,32	1,00	C 313	12500/1	
	0,35	1,00	KL 221	12100 A	
	0,40	1,20	KL 222	12100 A	
	0,43	1,20	C 314	12500/1	
	0,50	1,40	KL 223	12100 A	
	0,70	1,80	KL 224	12100 A	
	0,70	2,00	KL 225	12100 A	
0,17	0,40	1,20	C 330	12500/2	
	0,50	1,20	C 338	12500/2	
	0,60	1,30	C 347	12500/2	
0,18	0,40	1,20	KL 226	12100 B	
	0,50	1,40	KL 227	12100 B	
	0,70	1,80	KL 228	12100 B	
	0,70	2,00	KL 229	12100 B	
0,19	0,32	1,00	C 315	12500/1	
	0,40	1,20	C 326	12500/2	
0,20	0,40	1,20	KL 230	12100 B	
	0,50	1,40	KL 231	12100 B	
	0,60	1,20	C 348	12500/2	
	0,70	1,80	KL 232	12100 B	
	0,70	2,00	KL 233	12100 B	
	1,00	1,20	L 01	12000/I	I
0,21	0,40	1,00	C 333	12500/2	
	0,50	1,60	C 301	12500/1	
	0,70	1,20	C 343	12500/2	
	0,70	1,60	C 327	12500/2	
0,22	0,40	1,20	KL 234	12100 B	
	0,50	1,40	KL 235	12100 B	
	0,70	1,80	KL 236	12100 B	
	0,70	2,00	KL 237	12100 B	
0,23	0,50	1,20	C 337	12500/2	
0,24	0,40	1,20	KL 238	12100 B	
	0,50	1,40	KL 239	12100 B	
	0,70	1,80	KL 240	12100 B	
	0,70	2,00	KL 241	12100 B	
0,25	0,53	1,20	C 316	12500/1	
	0,60	1,20	C 334	12500/2	
	1,00	1,20	L 57	12000/I	I
0,26	0,40	1,20	KL 242	12100 B	
	0,50	1,40	KL 243	12100 B	
	0,70	1,20	C 344	12500/2	
	0,70	2,00	KL 244	12100 B	
	0,75	1,60	C 302	12500/1	
	1,20	2,00	C 303	12500/1	
0,28	0,40	1,20	KL 245	12100 B	
	0,50	1,40	KL 246	12100 B	
	0,70	2,00	KL 247	12100 B	
0,30	0,40	1,20	KL 248	12100 B	
	0,50	1,40	KL 249	12100 B	
	0,65	1,20	C 335	12500/2	
	0,70	2,00	KL 250	12100 B	
	0,90	1,30	C 345	12500/2	
	1,00	1,20	L 02	12000/I	I
	1,40	1,80	L 64	12000b	II
	1,90	1,80	L 86	12000/V	II
0,31	0,70	1,20	C 331	12500/2	
	0,70	2,00	C 328	12500/2	
	0,75	1,60	C 304	12500/1	
	1,20	2,00	C 305	12500/1	
0,32	0,53	1,20	C 317	12500/1	
	0,70	1,60	C 339	12500/2	
0,33	0,95	1,70	C 340	12500/2	
0,35	0,40	1,20	KL 251	12100 C	
	0,50	0,70	KL 276	12100 D	
	0,60	1,60	KL 252	12100 C	
	1,00	1,20	L 58	12000/I	I
0,38	0,60	1,20	C 336	12500/2	
0,40	0,50	0,80	KL 277	12100 D	
	0,50	1,40	KL 253	12100 C	
	0,70	1,80	KL 254	12100 C	
	1,00	1,20	L 03	12000/I	I
	1,40	1,80	L 08	12000/II	II
	1,90	1,80	L 87	12000/V	II
0,41	0,70	1,60	C 307	12500/1	
	0,70	2,50	C 329	12500/2	
	0,75	1,20	C 306	12500/1	
	0,90	1,30	C 346	12500/2	
	1,20	2,00	C 308	12500/1	
0,45	0,40	1,20	KL 255	12100 C	
	0,50	0,80	KL 278	12100 D	
	0,60	1,60	KL 256	12100 C	
	1,00	1,20	L 59	12000/I	I
0,50	0,50	0,90	KL 279	12100 D	
	0,50	1,40	KL 257	12100 C	
	0,70	1,80	KL 258	12100 C	
	1,00	1,20	L 04	12000/I	I
	1,00	1,60	C 349	12500/2	
	1,40	1,80	L 09	12000/II	II
	1,90	1,80	L 32	12000/V	II
	2,70	1,80	L 94	12000/VII	II
0,51	1,00	2,00	C 309	12500/1	
0,55	0,40	1,20	KL 259	12100 C	
	0,60	1,00	KL 280	12100 D	
	0,60	1,60	KL 260	12100 C	
	1,00	1,20	L 60	12000b	
0,60	0,50	1,40	KL 261	12100 C	
	0,60	1,00	KL 281	12100 D	
	0,80	2,60	KL 262	12100 C	
	1,00	1,20	L 05	12000/I	I
	1,40	1,80	L 10	12000/II	II
	1,90	1,80	L 33	12000/V	II
	2,70	1,80	L 95	12000/VII	II
0,61	1,00	2,00	C 310	12500/1	
0,65	0,60	1,10	KL 282	12100 D	
	0,60	1,60	KL 263	12100 C	
	0,70	2,00	KL 264	12100 C	
0,70	0,60	1,10	KL 283	12100 D	
	0,70	1,80	KL 265	12100 C	
	0,80	2,30	KL 266	12100 C	
	1,00	1,20	L 06	12000/I	I
	1,40	1,80	L 11	12000/II	II
	1,90	1,80	L 34	12000/V	II
	2,70	1,80	L 96	12000/VII	II
0,75	0,70	1,20	KL 284	12100 D	
	0,70	2,00	KL 267	12100 C	
0,79	0,50	1,40	KL 292	12100 D	
	0,60	1,60	KL 293	12100 D	

B	H	D	KWM-No.	S	RA
0,80	0,70	1,20	KL 285	12100 D	
	0,70	1,80	KL 268	12100 C	
	0,80	3,00	KL 269	12100 C	
	1,00	1,20	L 07	12000a	I
	1,40	1,80	L 12	12000/II	II
	1,90	1,80	L 35	12000/V	II
	2,70	1,80	L 97	12000/VII	II
0,85	0,70	2,00	KL 270	12100 C	
	0,80	1,30	KL 286	12100 D	
0,90	0,80	1,30	KL 287	12100 D	
	0,80	2,30	KL 271	12100 C	
	0,80	3,00	KL 272	12100 C	
	1,00	1,80	L 61	12000b	II
	1,40	1,80	L 13	12000/II	II
	1,90	1,80	L 36	12000/V	II
	2,70	1,80	L 98	12000b	II
0,95	0,80	2,60	KL 273	12100 C	
	0,80	1,40	KL 288	12100 D	
0,99	0,50	1,40	KL 294	12100 D	
	0,60	1,60	KL 295	12100 D	
	0,70	1,80	KL 296	12100 D	
1	0,80	1,40	KL 289	12100 D	
	0,80	2,30	KL 274	12100 C	
	0,80	3,00	KL 275	12100 C	
	1,00	1,80	L 62	12000b	II
	1,40	1,80	L 65	12000b	II
	1,40	2,70	L 14	12000/II	III
	1,90	1,80	L 37	12000/V	II
	2,70	2,70	L 99	12000/VII	III
1,05	0,90	1,50	KL 290	12100 D	
1,10	0,90	1,50	KL 291	12100 D	
	1,00	1,80	L 63	12000b	II
	1,40	1,80	L 66	12000b	II
	1,40	2,70	L 15	12000/II	III
	1,90	2,70	L 38	12000/V	III
	2,70	2,70	L 100	12000b	III
1,19	0,70	2,00	KL 297	12100 D	
	0,80	2,30	KL 298	12100 D	
1,20	1,40	2,70	L 16	12000/II	III
	1,90	2,70	L 39	12000/V	III
	2,70	2,70	L 101	12000/VII	III
1,30	1,40	2,70	L 17	12000/II	III
	1,90	2,70	L 40	12000/VI	III
	2,70	2,70	L 102	12000b	III
1,39	0,80	2,60	KL 299	12100 D	
	0,80	3,00	KL 300	12100 D	
1,40	1,40	2,70	L 18	12000/III	III
	1,90	2,70	L 41	12000/VI	III
	2,70	2,70	L 103	12000/VII	III
1,50	1,40	2,70	L 19	12000/III	III
	1,90	2,70	L 42	12000/VI	III
	2,70	2,70	L 104	12000b	III
1,[illegible]	1,40	2,70	L 20	12000/III	III
	1,90	2,70	L 43	12000/VI	III
	2,70	2,70	L 105	12000/VII	III
1,70	1,40	2,70	L 67	12000b	III
	1,90	2,70	L 88	12000b	III
	2,70	2,70	L 106	12000b	III
1,80	1,40	2,70	L 21	12000/III	III
	1,90	2,70	L 44	12000/VI	III
	2,70	2,70	L 107	12000/VII	III
1,90	1,40	2,70	L 68	12000b	III
	1,90	2,70	L 89	12000b	III
	2,70	2,70	L 108	12000b	III
2,00	1,40	3,50	L 22	12000/III	IV
	1,90	3,50	L 45	12000/VI	IV
	2,70	3,50	L 109	12000/VII	IV
2,10	1,40	3,50	L 69	12000b	IV
	1,90	3,50	L 90	12000b	IV
	2,70	3,50	L 110	12000b	IV
2,20	1,40	3,50	L 23	12000/III	IV
	1,90	3,50	L 46	12000/VI	IV
	2,70	3,50	L 111	12000b	IV
2,30	1,40	3,50	L 70	12000b	IV
	1,90	3,50	L 91	12000b	IV
	2,70	3,50	L 112	12000b	IV
2,40	1,40	3,50	L 24	12000/III	IV
	1,90	3,50	L 47	12000/VI	IV
	2,70	3,50	L 113	12000b	IV
2,50	1,40	3,50	L 71	12000b	IV
	1,90	3,50	L 92	12000b	IV
	2,70	3,50	L 114	12000b	IV
2,60	1,40	3,50	L 25	12000/III	IV
	1,90	3,50	L 48	12000/VI	IV
	2,70	3,50	L 115	12000b	IV
2,70	1,40	3,50	L 72	12000b	IV
	1,90	3,50	L 93	12000b	IV
	2,70	3,50	L 116	12000b	IV
2,80	1,40	3,50	L 26	12000/III	IV
	1,70	5,90	L 79	12000b	V
	1,90	3,50	L 49	12000/VI	IV
	2,70	3,50	L 117	12000b	IV
2,90	1,40	4,70	L 138	12000/X	IV a
	1,40	5,90	L 73	12000b	V
	1,70	5,90	L 80	12000b	V
	2,70	4,70	L 143	12000/X	IV a
3,00	1,40	4,70	L 139	12000/X	IV a
	1,40	5,90	L 27	12000/III	V
	1,70	5,90	L 50	12000a	V
	2,70	4,70	L 144	12000/X	IV a
	2,70	5,90	L 118	12000/VIII	V
3,20	1,40	4,70	L 140	12000/X	IV a
	1,40	5,90	L 28	12000/IV	V
	1,70	5,90	L 51	12000a	V
	2,70	4,70	L 145	12000/X	IV a
	2,70	5,90	L 119	12000/VIII	V
3,40	1,40	4,70	L 141	12000/X	IV a
	1,40	5,90	L 74	12000b	V
	1,70	5,90	L 81	12000/IV	V
	2,70	4,70	L 146	12000/X	IV a
	2,70	5,90	L 120	12000/VIII	V
3,60	1,40	4,70	L 142	12000/X	IV a
	1,40	5,90	L 29	12000/IV	V
	1,70	5,90	L 52	12000a	V
	2,70	4,70	L 147	12000/X	IV a
	2,70	5,90	L 121	12000/VIII	V
3,80	1,40	5,90	L 75	12000b	V
	1,70	5,90	L 82	12000/IV	V
	2,70	5,90	L 122	12000/VIII	V
4,00	1,40	5,90	L 76	12000b	V
	1,70	5,90	L 83	12000/IV	V
	2,70	5,90	L 123	12000/VIII	V
4,20	1,40	5,90	L 30	12000/IV	V
	1,70	5,90	L 53	12000a	V
	2,70	5,90	L 124	12000/VIII	V
4,40	1,40	5,90	L 77	12000b	V
	1,70	5,90	L 84	12000/IV	V
	2,70	5,90	L 125	12000/VIII	V
4,60	1,40	5,90	L 31	12000/IV	V
	1,70	5,90	L 54	12000/IV	V
	2,70	5,90	L 126	12000/VIII	V
4,80	1,40	5,90	L 78	12000b	V
	1,70	5,90	L 85	12000/IV	V
	2,70	5,90	L 127	12000/VIII	V
5,00	3,00	8,70	L 128	12000/IX	VI
5,20	3,00	8,70	L 129	12000/IX	VI
5,40	3,00	8,70	L 130	12000/IX	VI
5,60	3,00	8,70	L 131	12000/IX	VI
5,80	3,00	8,70	L 132	12000/IX	VI
6,00	3,00	8,70	L 133	12000/IX	VI
6,20	4,00	8,70	L 134	12000/IX	VI
6,40	4,00	8,70	L 135	12000/IX	VI
6,60	4,00	8,70	L 136	12000/IX	VI
6,80	4,00	8,70	L 137	12000/IX	VI

B = Bore H = Height D = Outside diameter KWM No. = Reference No. for dimensions and packs
S = Reference number of assortment RA = Reamer site. All dimensions are in mm.
All bearings L 01 – L 59 are also included in basic assortment No. 12000a, Bushes L 60 – L 117 are also included in Supplementary Assortment No. 12000 b.