



Spindle Units

Internal grinding
External grinding
Face grinding
Thread grinding
Tooth flank grinding
Fine Boring
Special machining

Edition 01/2003





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Table of contents

	Page
Preface	3
General information	
Ordering	4
Design of the grinding spindles	5
Technical data	8
Acceptance tolerances	9
Calculation of the cutting force and the motor output	11
Production programme	
belt-driven spindles, fitted with bearings series B 70 . . .	
SFIL	12
SFIV	14
Accessories for SFIL / SFIV	16
SFAL	18
SFAV	20
Accessories for SFAL / SFAV	22
SFAA	24
Accessories for SFAA	26
Grinding wheel carriers for spindle with male taper	27
belt-driven spindles, fitted with bearings series B 72 . . .	
SSV	28
SSI / SSB	30
SSA	32
O-SSA	34
SPV	36
SPA	38
Tooth-flank grinding spindles SPAZ	39
Face grinding spindles IAO / SSST	40
Grinding spindles SSAA	41
Motor grinding spindles MNFA	42
Accessories for MNFA	44
Belt pulleys for grinding spindles	45
Abutment dimensions	
SSI	46
SPV, SSV, SSB	47
SSA, O-SSA, SPV, SPA	48
All series	49
Safety requirements	50
Stiffness	51
Weight table of grinding spindles	52
Circumferential speeds	53
Notices	54
Production programme and position	56

Preface

The company Spindel- und Lagerungstechnik Fraureuth GmbH is a new company, since 1993 supplying high grade products to longstanding as well as to fresh clients in the fields of spindle units and bearing engineering incl. spindle bearings (high-precision bearings). In the field of spindle units we can look back on more than 40 years of experience in designing and production.

Special design categories are:

- belt-driven grinding spindles
- motor grinding spindles with integrated motor
- motor grinding spindles with flanged-on motor
- spindles for multiple spindle heads with a variety of clamping systems for
- external cylindrical grinding, internal grinding and face grinding, for milling, drilling and turning as well as for specific ranges of application, e.g. wood and glass machining (sheet glass grinding, decoration glass grinding).

All spindles correspond to highest quality standards. They excel by their extremely smooth and quiet running, long service life and easy maintenance and servicing. They allow extremely good cutting capacities and surface finishes of the workpieces.

Everyday our grinding spindles are proved in our own bearing production. Exactly in this field they have to meet the highest requirements.

Our service also covers repair of grinding spindles at a short notice. The repaired spindles are tested on test stands and are submitted to final inspection with regard to vibration, radial runout, temperature and if necessary stiffness (with certificate) by analogy with fresh produced spindles.



Ordering

The grinding spindle production programme covers a carefully assorted variety of designs. This enables us always to offer you the grinding spindle best suitable for small-scale production and series production.

For special machining jobs we can offer you either a modified standard grinding spindle or a special grinding spindle, e.g.:

- belt-driven precision grinding spindles for high speeds
- motor grinding spindles
- tool spindles, tooth-flank grinding spindles and special spindles
- accessories:
 - oil mist lubricators
 - belt pulleys, flanges
 - screw-in mandrels

When ordering a normal standard spindle

please indicate

- precise and complete type designation
- sense of rotation
- please order accessories, e.g. screw-in mandrels, flanges and belt pulleys, separately

Ordering a standard spindle for specific applications

If you order a standard spindle for specific applications, we need the following additional information:

- purpose, type of work, required quality, workpiece dimensions (maybe enclose drawing)
- mounting position: horizontal or vertical
- speed
- are individual or several units needed (small-scale production or series production), operating times
- rating of the drive motor
- radial and axial loads acting on the spindle shaft

For further information see section „Technical service“.

Ordering spare parts

- Please indicate the type designation and serial number of the spindle.
- Before ordering spare parts for older spindles, please inquire whether the parts are still available.

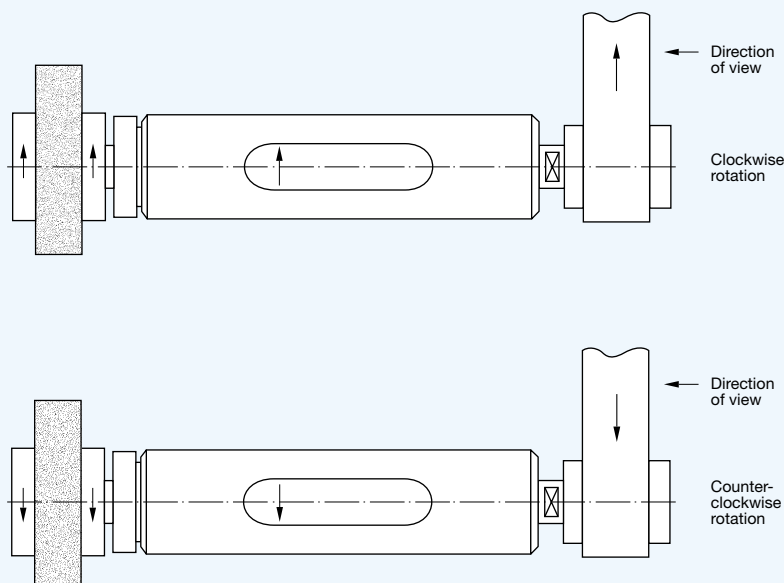
Order example for a standard spindle

Type SSA,
Housing outside dia 100 mm,
500 mm long for clockwise rotation,
with 200 mm dia belt pulley,
flange for grinding wheel 250 \varnothing x 50 mm wide and bore diameter 76 mm.

Complete order data

Grinding spindle SSA 100 x 500/3 R
Belt pulley R 08-200 x 100
Flange SA 08-76 x 130

Definition of the sense of rotation



Design of the grinding spindles

Belt-driven grinding spindle units

Standard grinding spindles fitted with bearings series B 70...

SFIL – For light grinding operations. For small and mean bore diameters: Series of SFIL with inner cylinder for screw-in mandrels.

SFIV – For heavy grinding operations: Series of SFIV in reinforced execution with inner cylinder for screw-in mandrels.

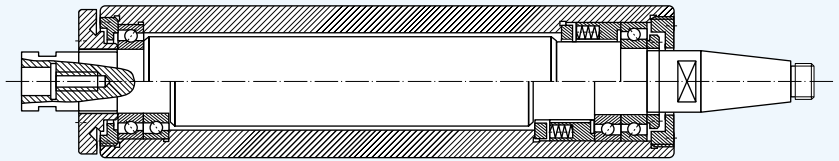
SFAL – For light grinding operations. For internal grinding: Series of SFAL with male taper for grinding wheel flanges.

SFAV – For heavy grinding operations: Series SFAV in reinforced execution with male taper for grinding wheel flanges.

SFAV – For internal grinding, external grinding, face grinding: Series of SFAV in reinforced execution with male taper for grinding wheel flanges from 160 mm of housing outside diameter.

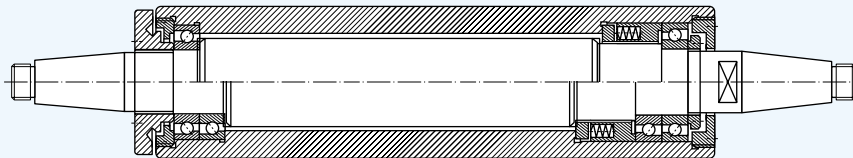
SFAA – For internal grinding particularly deep holes: Series of SFAA with stepped housing and male taper for grinding wheel flanges.

SFIL



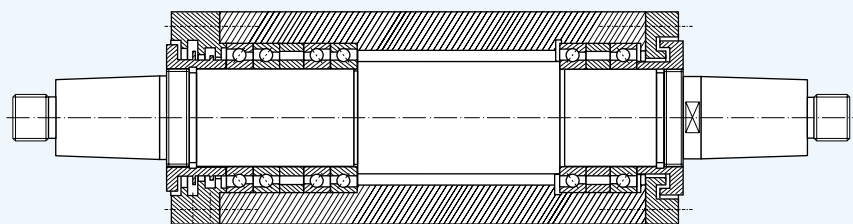
SFIV

SFAL

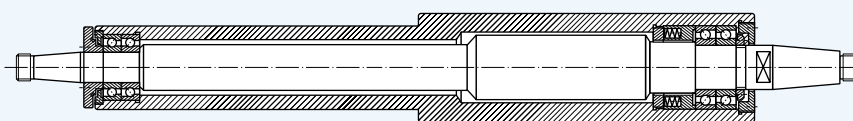


SFAV

SFAV



SFAA



Design of the grinding spindles

Belt-driven grinding spindle units

Standard grinding spindles

The standard grinding spindles of types SSV, SSI, SSB, SSA and SSAA are designed for bore grinding. Special Belleville springs are installed at the pulley end to ensure that the bearing arrangement always has zero clearance.

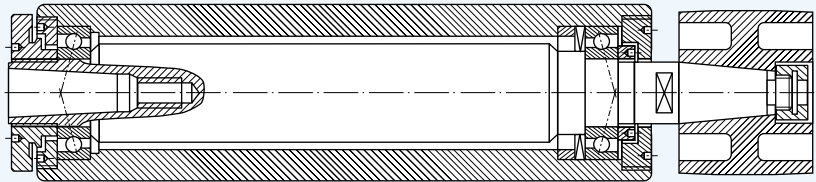
For-life lubricated spindles require practically no maintenance. Highly efficient seals prevent grinding fluids and other contaminants from penetrating into the spindles.

The O-SSA standard spindles are suitable for external grinding, grinding of large bores and particularly for face grinding. Precision ball bearings with a steeper contact angle are used to accommodate the high axial loads.

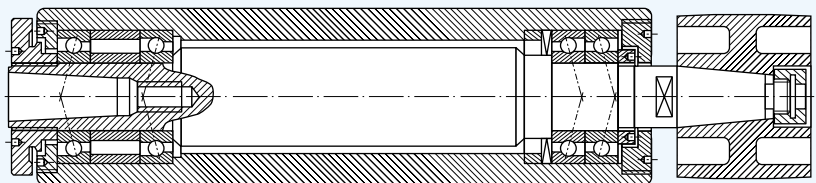
Precision grinding spindles

The grinding spindles of series SPV and SPA provide a higher precision than standard grinding spindles. Ball bearings of quality class P2S (ABEC 9) are used.

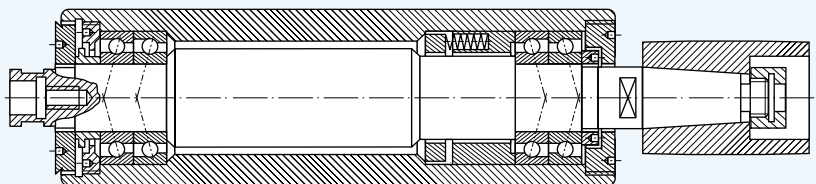
These spindles are used especially where a large number of different bores have to be ground with high precision, particularly when it is still uneconomic to buy an assortment of electric grinding spindles. They should be driven by a highfrequency motor.



SSI, SSA with housing outside diameters of up to 50 mm

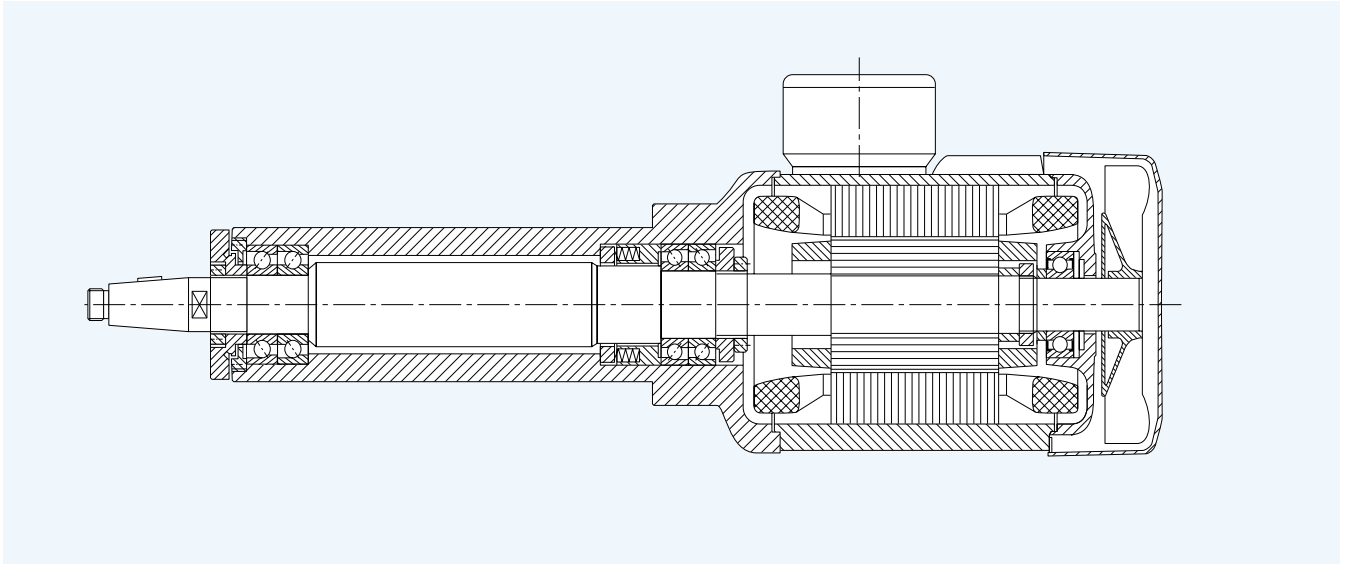


SSI, SSB, SSA, SSV with housing outside diameters from 60 mm
on **O-SSA** any housing outside diameters



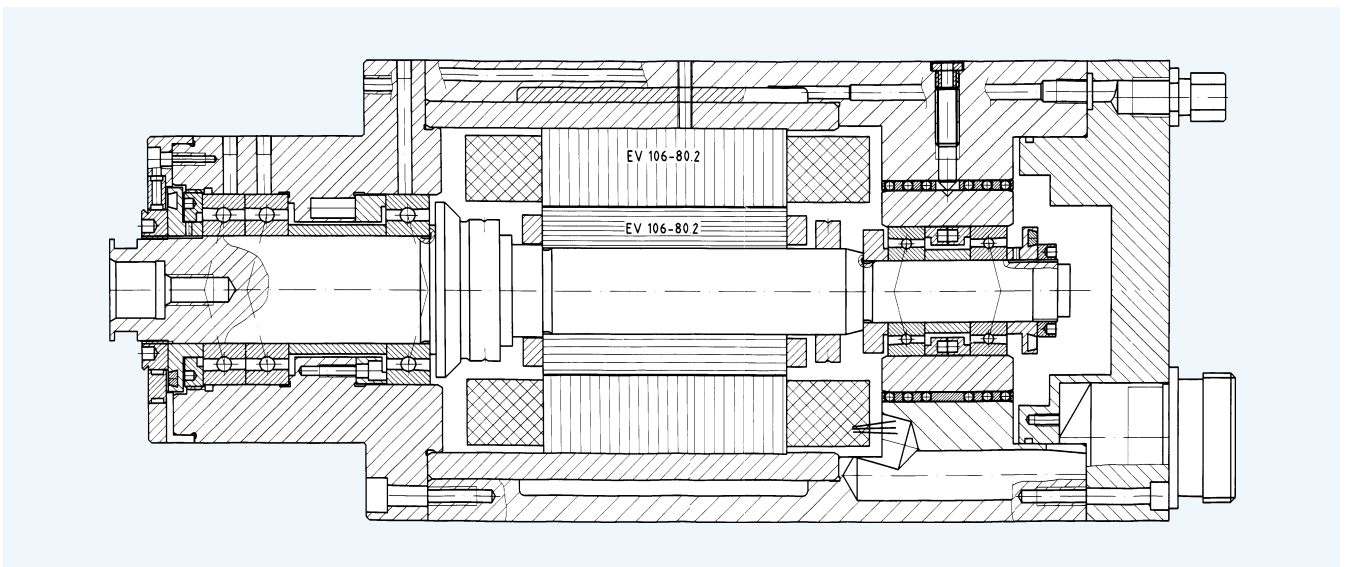
SPV, SPA

Motor grinding spindle units



MNFA

For all grinding operations: Series of MNFA with flanged-on motor and male taper.



MF, MFL

For grinding the interior circularly: Bearing arranged grinding spindle units with integrated motor.

Gladly we place special documents at disposal on request.

Technical data

Order numbers

The type designation code is engraved on the belt-driven grinding spindles. The complete order numbers are listed in the tables. Additional numbers are used for special designs.

The meaning of the codes is illustrated in the figure on the right.

Spindle holders

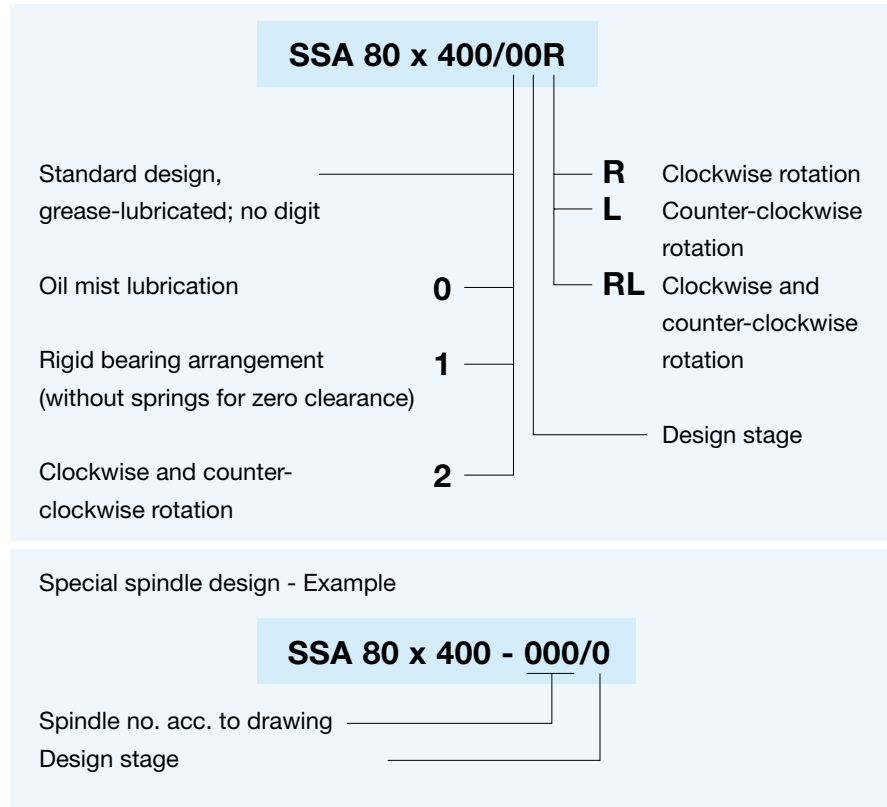
The grinding spindle has to be chucked on a length which is at least twice the spindle diameter. If possible, split spindle holders should be used, provided with a spreading screw to facilitate mounting of the spindle. Avoid blows to the spindle. The spindle should also not be clamped in the spindle holder by means of thrust bolts which act directly on the spindle housing. When chucking the spindle housing in the holder take care not to ovaly deform it. Sufficiently precise spacer sleeves can be used for grinding spindle housings whose outside diameter is smaller than the bore of the spindle holder. Please observe the operating instructions.

Spindle bearings

Precision grinding spindles are exclusively fitted with precision bearings of tolerance class P2S (ABEC 9). The belt-driven standard grinding spindles are fitted with bearings of tolerance class P4, DIN 620, ISO 1132 (ABEC 7). Special bearings for special applications can be designed after consulting our technical department.

Speed

The maximum speed for every spindle type indicated in the catalogue and



on the grinding spindle must not be exceeded. Never the maximum circumferential speed for the grinding wheels indicated by the grinding wheel manufacturer must be exceeded.

Sense of rotation

To allow smooth handling of orders, please indicate the desired sense of rotation (R or L; spindles suitable for both clockwise rotation and counter-clockwise rotation are designated RL).

Lubrication

All belt-driven grinding spindles are lubricated for life.

In some cases, oil mist lubrication can be used to enable higher spindle speeds. With this lubricating system the oil is atomized and carried through

the bearings by a constant air current. This lubrication method offers the advantage that a perfect lubricating film is generated. Additionally the bearings are cooled by the air current. And, most important of all, the overpressure within the spindle prevents foreign matter from penetrating into the spindle system.

Acceptance tolerances

Belt pulleys

The belt pulleys are dynamically balanced. The size suitable for each application is recommended in the tables. The complete assortment with order numbers can be found on page 45.

For a low-vibration drive we recommend to use endless textile drive belts.

Repair and bearing replacement

Technical knowledge is a must when repairing spindles. If experts with such technical knowledge are not available, spindles should be repaired by the manufacturer.

The bearing replacement requires particularly good knowledge of how to handle these high-precision bearings.

We urgently recommend having this work done by our experts. Our repair service department guarantees that it will be done quickly. The repaired spindles are as good as new.

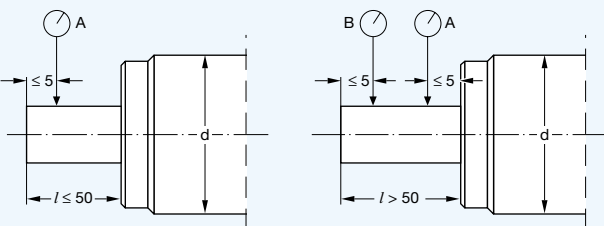
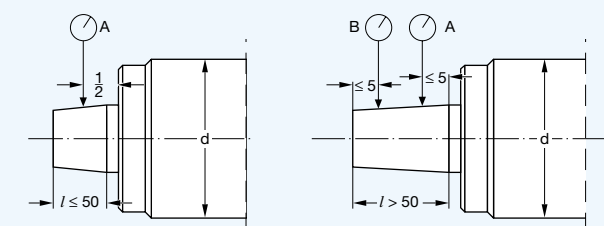
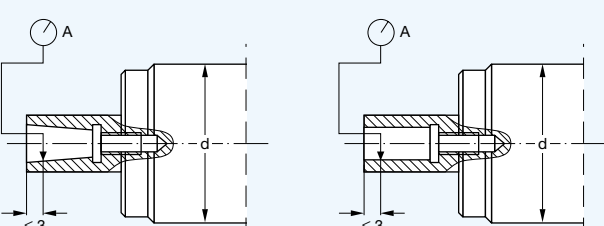
You can also order replacement spindles.

We can supply you at any time with replacement bearings so that you can repair the spindles yourself.

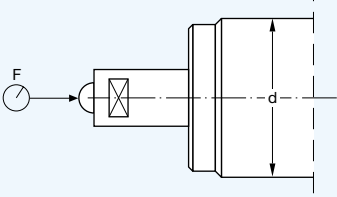
Acceptance tolerances

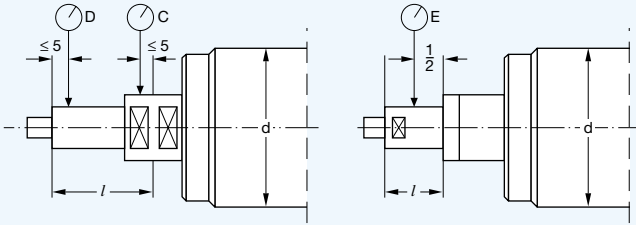
All grinding spindles are tested in a test run of several hours. In the final inspection especially the dimensional deviation and the position deviations of the shaft are checked.

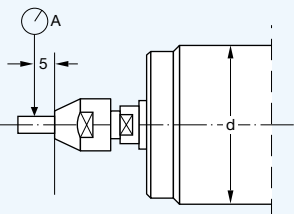
The following excerpt from our plant acceptance specification indicates the maximum admissible dimensional and position deviations of the shaft ends after mounting.

Max. admissible values (Werkstandard und DIN 8637)		Radial runout of the spindle shaft (in μm)					
Set-up of measuring instruments		Spindle type	Measuring point				
			A		B		
		Spindle housing outside diameter					
		≤ 70		≥ 80			
				≤ 70		≥ 80	
	Standard	SSV	5	6	5	8	
	Standard	SSA O-SSA SSAA	5	6	5	8	
	Precision	SPA MNFA SFAL SFAV SFAA	2	2	3	4	
		Standard	SSV SSI SSB	5	6	-	-
	Precision	SPV MF MFL SFIL SFIV	2	2	-	-	

Acceptance tolerances

Max. admissible values (Werkstandard and DIN 8637)	Axial runout of the spindle shaft (in μm)	
Set-up of measuring instruments	Spindle type	Measuring point F
	all types	1

Max. admissible values (Werkstandard and DIN 8637)	Radial runout of the screw-in mandrel (in μm)							
Set-up of measuring instruments	Spindle type	Measuring point						
		C $\varnothing d$		D $l \leq$		E		
		≤ 70	≥ 80	50	100	150		
 <p>SSI, SSB, SPV, MF, MFL, SFIL, SFIV</p> <p>SSV</p>	Standard	SSV	-	-	-	-	30	
	Standard	SSI SSB	10	12	20	25	30	-
	Precision	SPV MF MFL SFIL SFIV	8	8	8	12	18	-

Max. admissible values (Werkstandard and DIN 8637)	Radial runout of the chuck (in μm)	
Set-up of measuring instruments	Spindle type	Measuring point A
	SSI	50

Calculation of the cutting force and the motor output

Grinding is a machining process which uses a number of geometrically undetermined cutting edges. The grinding process is influenced by a variety of factors, e.g. bond, grade, grain size and porosity of the grinding wheels, cooling, grinding wheel speed and workpiece speed, feed and strength of the workpiece.

The cutting force F_s can be calculated generally by means of the following formula:

$$F_s = \tau_0 \frac{a \cdot s \cdot u_w}{v_s \cdot 60} \text{ (N)}$$

where

τ_0 = shear strength in N/mm²;

for a first approximation,

δ_B can be used

a = feed (depth of cut) in mm

s = longitudinal feed in mm/rotation

u_w = circumferential speed of the workpiece in m/min

v_s = circumferential speed of the grinding wheel in m/s

This formula applies both to internal and external grinding. It also applies to external plunge-cut grinding if the cutting width is taken instead of the feed „a“, and if the table traverse rate is taken instead of the circumferential speed of the workpiece u_w .

For the calculation of the motor power P_A :

$$P_A = \frac{F_s \cdot v_s}{\eta} \text{ (W)}$$

where

η = efficiency of the grinding spindle including the belt drive.

The standard value $\eta \approx 0,8$.

For special requirements (e.g. for special machines) tests have to be carried out where cutting force, moment or power are accurately measured under identical cutting conditions.

Standard values for grinding

(Excerpt from „Spanende Formung“, published by Verlag Technik, Berlin)

grain size, grade and speed of the grinding wheels during grinding - Table 1

Grinding of with	Steel, soft				Steel, hard				Cast iron				Light metal			
	Corundum				Corundum				Silicon carbide				Silicon carbide			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Grain size ¹⁾	54	36	36	22	54	40	36	22	54	36	36	22	54	40	36	22
Grade	M	L	L	K	K	I	K	I	L	K	L	I	I	H	I	H
v_s (m/s)	32	25	32	32	25	32	32	32	25	20	25	25	16	12	16	16
$q = \frac{60 \cdot v_s}{u_w}$	125	80	80	50	125	80	80	50	100	63	63	40	50	32	32	20

¹⁾ Remark: Grain size in accordance with DIN 69 101:

H 6 ... 24 coarse
H 30 ... 60 medium
H 70 ... 180 fine
H 220 ... 1200 very fine

I Circular grinding, external
II Circular grinding, internal
III Surface grinding with the grinding wheel circumference
IV Surface grinding with the grinding wheel face

v_s Grinding wheel speed in m/s
 u_w Workpiece = speed in m/min

Depths of cut and feeds in grinding - Table 2

Depth of cut (μm)	Rough-grinding	20,0 ... 50
	Finish-grinding	2,5 ... 10
	Plunge-cut grinding	2,0 ... 8
Longitudinal feed s (mm/U)	Rough-grinding	$(2/3 \dots 4/5) \cdot B_1$
	Finish-grinding	$(1/4 \dots 1/2) \cdot B_1$

$B_1 \hat{=}$ Grinding wheel width in mm
The standard values apply well to all

grinding methods.
Sparking out without feed improves

the accuracy and surface finish.

Standard values for circular feed by means of table 1.

Series SFIL

Belt-driven grinding spindle units

This universal spindle type can be used for all kinds of bore grinding tasks. The large number of screw-in mandrels allows an optimum adaptation to every grinding task.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut for fastening the belt pulley
- A threaded pin for fastening the screw-in mandrel from housing diameter 60 mm
- Operating instructions

Please order accessories separately

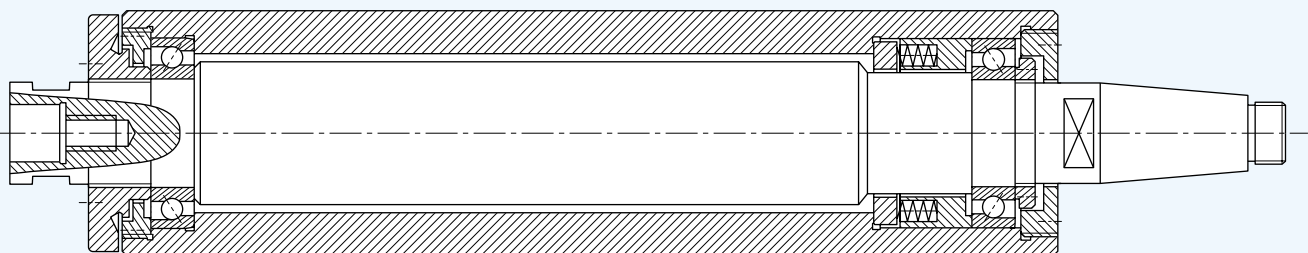
- Screw-in mandrel (see also page 16 and 17)
- Belt pulley (see also page 16, 17 and 45)

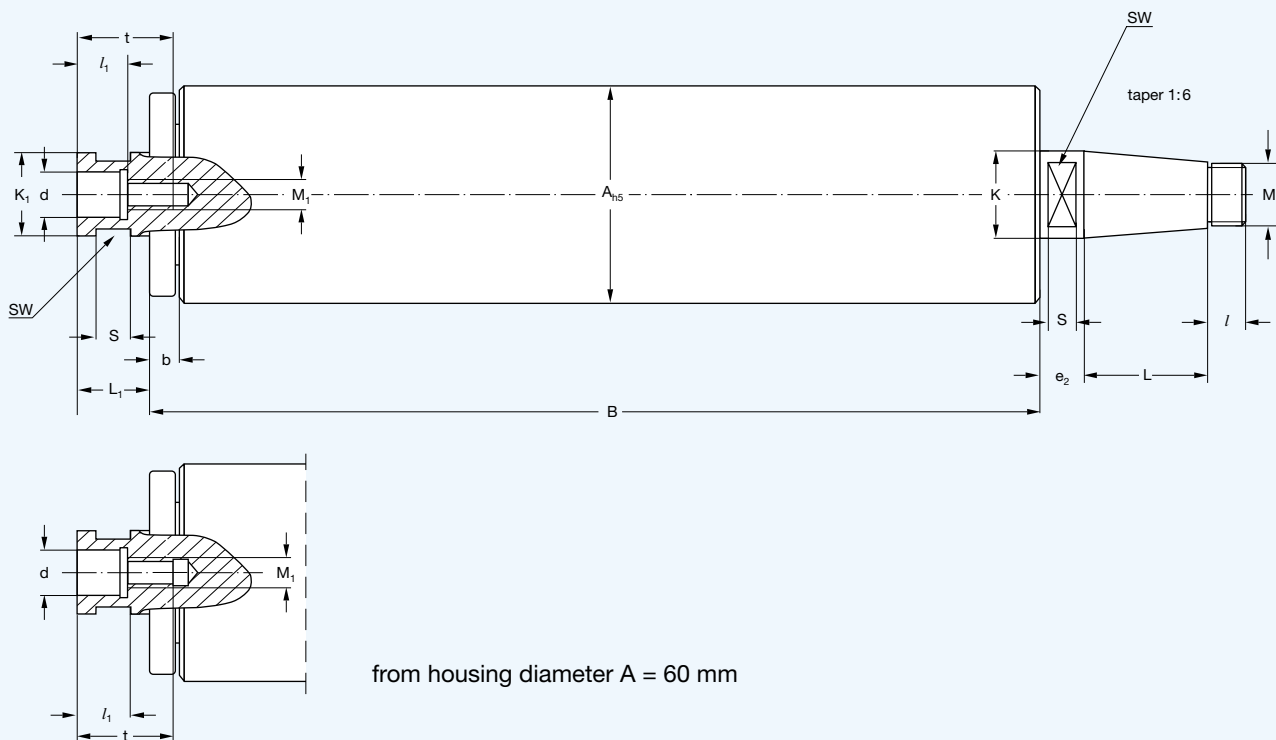
Lubrication

- For-life grease lubrication

Sense of rotation

- Please always indicate the sense of rotation when placing an order





Grinding spindle A x B	Dimensions in mm														Speed max. min ⁻¹
	K	L	K ₁	L ₁	e ₂	b	M	l	d	l ₁	M ₁	t	SW	S	
SFIL 40x160	13	20	13,5	12	7	7	M 8x1	7	7,2 ₀ ^{+0,004}	10,5	M 6	22	11	6	35 000
SFIL 40x200	13	20	13,5	12	7	7	M 8x1	7	7,2 ₀ ^{+0,004}	10,5	M 6	22	11	6	35 000
SFIL 40x250	13	20	13,5	12	7	7	M 8x1	7	7,2 ₀ ^{+0,004}	10,5	M 6	22	11	6	35 000
SFIL 50x160	15,5	24	15,5	12	7	8	M 10x1	7	8,2 ₀ ^{+0,004}	12	M 8	24	13	6	29 000
SFIL 50x200	15,5	24	15,5	12	7	8	M 10x1	7	8,2 ₀ ^{+0,004}	12	M 8	24	13	6	29 000
SFIL 50x250	15,5	24	15,5	12	7	8	M 10x1	7	8,2 ₀ ^{+0,004}	12	M 8	24	13	6	29 000
SFIL 60x200	23	34	23	16	10	8	M 12x1	10	13,2 ₀ ^{+0,004}	13	M 6	26	19	8	22 000
SFIL 60x250	23	34	23	16	10	8	M 12x1	10	13,2 ₀ ^{+0,004}	13	M 6	26	19	8	22 000
SFIL 60x315	23	34	23	16	10	8	M 12x1	10	13,2 ₀ ^{+0,004}	13	M 6	26	19	8	22 000
SFIL 70x200	28	42	28	20	13	9	M 15x1	11	16,2 ₀ ^{+0,006}	16	M 8	30	24	10	18 000
SFIL 70x250	28	42	28	20	13	9	M 15x1	11	16,2 ₀ ^{+0,006}	16	M 8	30	24	10	18 000
SFIL 70x315	28	42	28	20	13	9	M 15x1	11	16,2 ₀ ^{+0,006}	16	M 8	30	24	10	18 000
SFIL 80x200	33	48	33	25	14	10	M 20x1	12	18,2 ₀ ^{+0,006}	18	M 10	34	27	12	17 000
SFIL 80x250	33	48	33	25	14	10	M 20x1	12	18,2 ₀ ^{+0,006}	18	M 10	34	27	12	17 000
SFIL 80x315	33	48	33	25	14	10	M 20x1	12	18,2 ₀ ^{+0,006}	18	M 10	34	27	12	17 000

Series SFIV

Belt-driven grinding spindle units

This spindle unit has the same dimensions as series SFIL. However, for reason of reinforced execution it is suitable for major loads.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley
- A threaded pin for fastening the screw-in mandrel from housing diameter 60 mm
- Operating instructions

Please order accessories separately

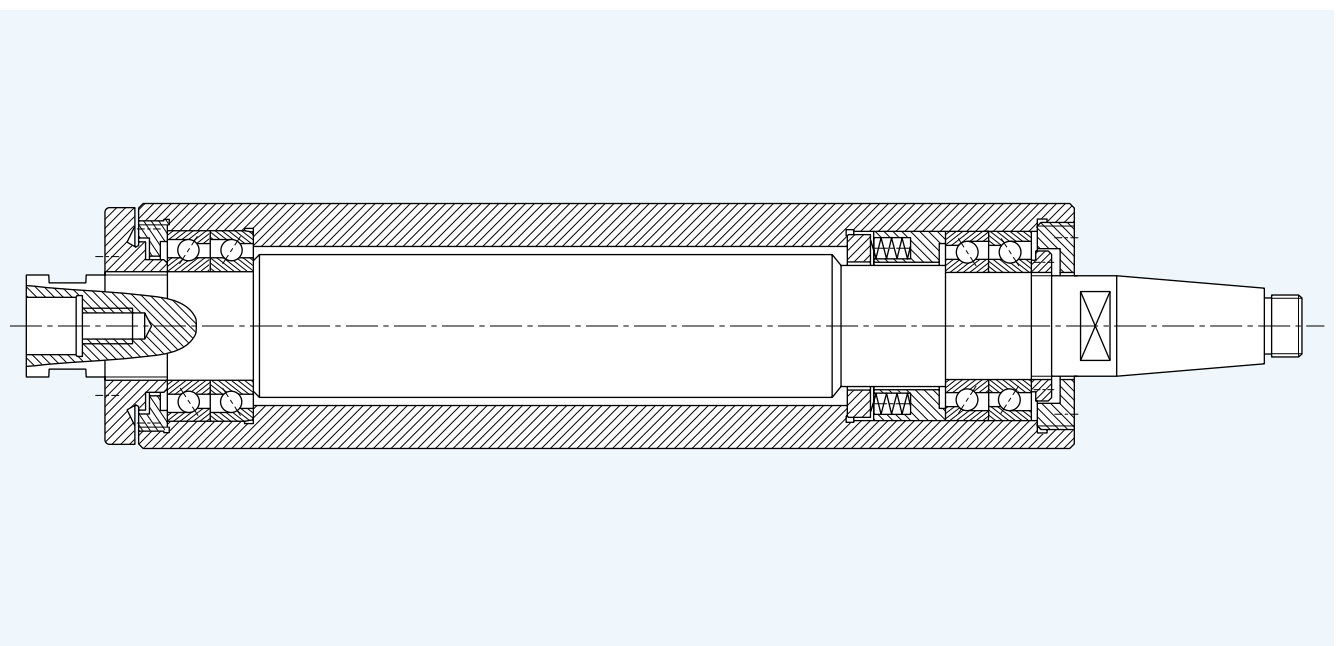
- Screw-in mandrel
(see also page 16 and 17)
- Belt pulley
(see also page 16, 17 and 45)

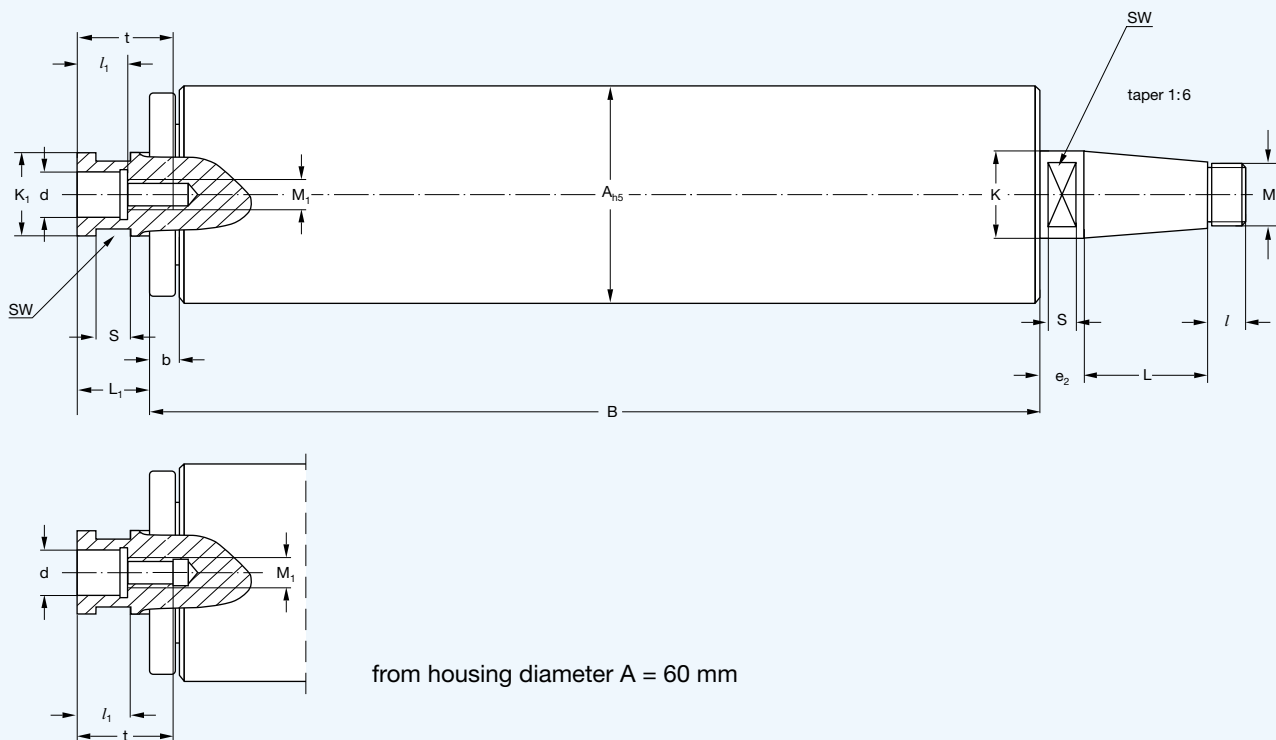
Lubrication

- For-life grease lubrication

Sense of rotation

- Please indicate the sense of rotation always when placing an order



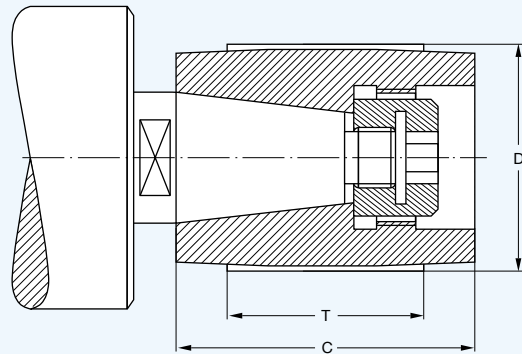
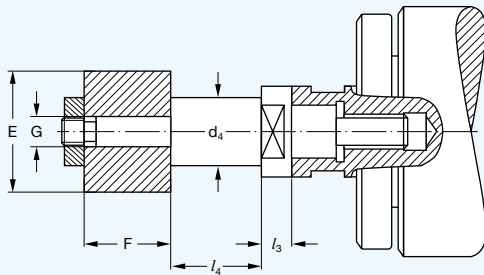


Grinding spindle A x B	Dimensions in mm														Speed max. min ⁻¹
	K	L	K ₁	L ₁	e ₂	b	M	l	d	l ₁	M ₁	t	SW	S	
SFIV 60x200	23	34	23	16	10	8	M 12x1	10	13,2 ^{+0,004 0}	13	M 6	26	19	8	22 000
SFIV 60x250	23	34	23	16	10	8	M 12x1	10	13,2 ^{+0,004 0}	13	M 6	26	19	8	22 000
SFIV 60x315	23	34	23	16	10	8	M 12x1	10	13,2 ^{+0,004 0}	13	M 6	26	19	8	22 000
SFIV 60x400	23	34	23	16	10	8	M 12x1	10	13,2 ^{+0,004 0}	13	M 6	26	19	8	20 000
SFIV 70x250	28	42	28	20	13	9	M 15x1	11	16,2 ^{+0,006 0}	16	M 8	30	24	10	18 000
SFIV 70x315	28	42	28	20	13	9	M 15x1	11	16,2 ^{+0,006 0}	16	M 8	30	24	10	18 000
SFIV 80x250	33	48	33	25	14	10	M 20x1	12	18,2 ^{+0,006 0}	18	M 10	34	27	12	17 000
SFIV 80x315	33	48	33	25	14	10	M 20x1	12	18,2 ^{+0,006 0}	18	M 10	34	27	12	17 000
SFIV 80x400	33	48	33	25	14	10	M 20x1	12	18,2 ^{+0,006 0}	18	M 10	34	27	12	14 500
SFIV 100x315	43	63	43	28	16	10	M 25x1	14	24 ^{+0,006 0}	24	M 12	42	36	14	13 000
SFIV 100x400	43	63	43	28	16	10	M 25x1	14	24 ^{+0,006 0}	24	M 12	42	36	14	13 000
SFIV 100x500	43	63	43	28	16	10	M 25x1	14	24 ^{+0,006 0}	24	M 12	42	36	14	13 000

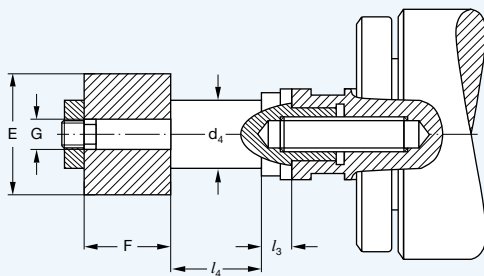
Accessories for Series SFIL / SFIV

To be able to fully utilize this precision in the grinding process, screw-in mandrels are fastened by means of a threaded pin from housing outside diameter 60 mm. This fastening system guarantees utmost radial run-out of the screwed-in mandrel.

up to housing outside diameter 60 mm (SZ)



from to housing outside diameter 60 mm (SZV)



Spindle unit	Screw-in mandrel Designation	Grinding wheel						Range of applic.		Belt pulley				Speed min ⁻¹
		d ₄ mm	l ₄	l ₃	E mm	F	G	Bore mm	Depth mm	Designation	D mm	C	T	
SFIL 40	SZK 02-6x16	6	16	8	13	13	4	20	25	R 02-28x40	28	40	32	30 000
	SZ 02-9x10	9	10	8	16	16	6	24	20					30 000
	SZ 02-9x25	9	25	8	16	16	6	24	35					25 000
	SZ 02-13x16	13	16	1)	20	20	6	30	34					25 000
	SZ 02-13x32	13	32	1)	20	20	6	30	50					25 000
SFIL 50	SZ 03-9x10	9	10	9	16	16	6	24	20	R 03-28x50	28	50	40	25 000
	SZ 03-9x20	9	20	9	16	16	6	24	30					25 000
	SZ 03-12x16	12	16	9	20	20	6	30	40					25 000
	SZ 03-12x32	12	32	9	20	20	6	30	46					25 000
	SZ 03-15x20	15	20	1)	25	25	8	38	42					18 000
	SZ 03-15x40	15	40	1)	25	25	8	38	62					18 000
SFIL 60 SFIV 60	SZV 05-13x16	13	16	10	25	25	8	38	32	R 05-40x63	40	63	50	18 000
	SZV 05-13x32	13	32	10	25	25	8	38	48					18 000
	SZV 05-18x20	18	20	10	32	32	10	48	40					18 000
	SZV 05-18x40	18	40	10	32	32	10	48	60					18 000
	SZV 05-23x32	23	32	1)	40	40	13	60	68					14 500
	SZV 05-23x50	23	50	1)	40	40	13	60	86					14 500
SFIL 70 SFIV 70	SZV 06-18x20	18	20	10	32	32	10	48	40	R 06-45x71	45	71	60	14 500
	SZV 06-18x40	18	40	10	32	32	10	48	60					14 500
	SZV 06-22x32	22	32	10	40	32	13	60	54					14 500
	SZV 06-22x50	22	50	10	40	32	13	60	72					14 500
	SZV 06-28x40	28	40	1)	40	40	16	68	78					12 500
	SZV 06-28x63	28	63	1)	40	40	16	68	100					12 500
SFIL 80 SFIV 80	SZV 07-22x32	22	32	12	40	32	13	60	54	R 07-50x80	50	80	60	14 000
	SZV 07-22x50	22	50	12	40	32	13	60	72					14 000
	SZV 07-28x40	28	40	12	50	40	16	68	68					12 500
	SZV 07-28x63	28	63	12	50	40	16	68	90					12 500
	SZV 07-33x50	33	50	1)	50	50	20	75	95					11 000
	SZV 07-33x80	33	80	1)	50	50	20	75	125					11 000
SFIV 100	SZV 09-28x40	28	40	15	50	40	16	68	68	R 09-60x90	60	90	70	10 400
	SZV 09-28x63	28	63	15	50	40	16	68	90					10 400
	SZV 09-33x50	33	50	15	50	50	20	75	95					10 400
	SZV 09-33x80	33	80	15	50	50	20	75	125					10 400
	SZV 09-43x63	43	63	1)	63	63	25	85	120					10 400
	SZV 09-43x100	43	100	1)	63	63	25	85	160					10 400

¹⁾ These screw-in mandrels are not stepped. · Drive: Motor speed 2 860 min⁻¹, motor belt pulley ø 220 mm

Series SFAL

Belt-driven grinding spindle units

Grinding spindle for external grinding and for deep holes where diameters are wider than that of the spindle.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

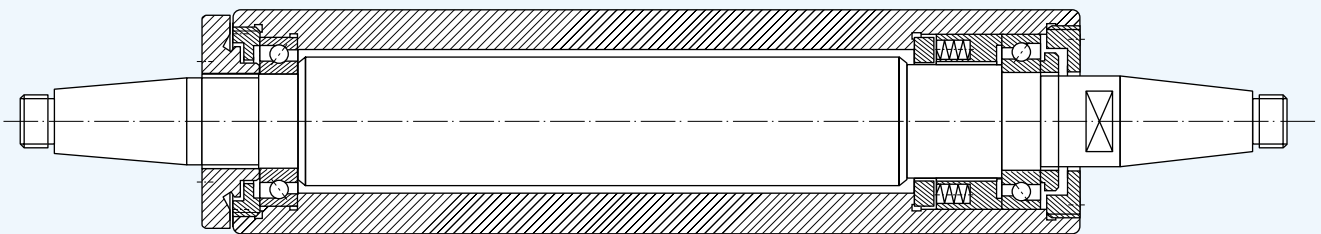
- Flange (see also page 22 and 23)
- Belt pulley (see also page 22, 23 and 45)
- Balancing arbour for flange

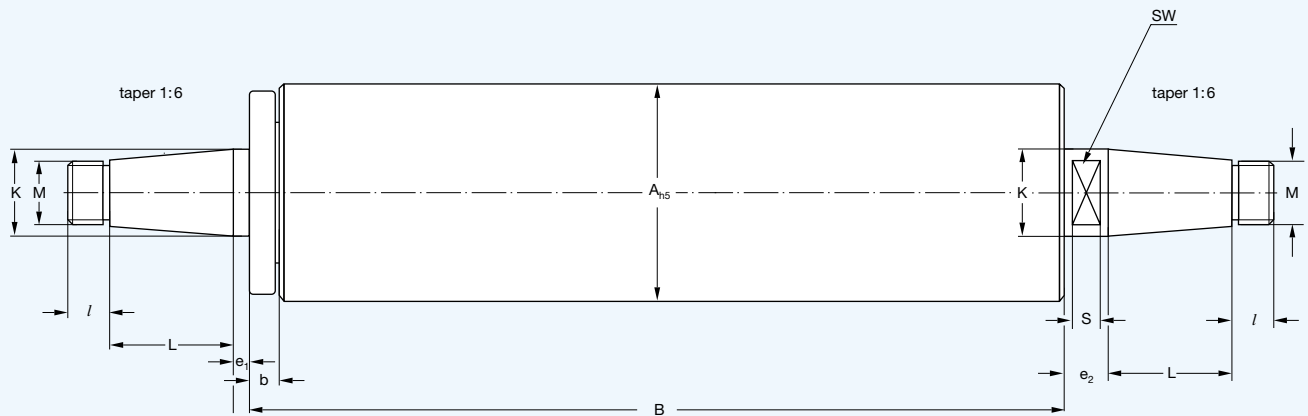
Lubrication

- For-life grease lubrication

Sense of rotation

- Please indicate the sense of rotation always when placing an order





Grinding spindle A x B	Dimensions in mm									Speed max. min ⁻¹
	K	L	e ₁	e ₂	b	M	l	SW	S	
SFAL 32x125 SFAL 32x160 SFAL 32x200	9	14	1,6	6	6	M 6	6	8	4	36 000
SFAL 40x160 SFAL 40x200 SFAL 40x250	13	20	2	7	7	M 8x1	7	11	6	35 000
SFAL 50x160 SFAL 50x200 SFAL 50x250	15,5	24	2	8	8	M 10x1	8	13	6	29 000
SFAL 60x200 SFAL 60x250 SFAL 60x315	22	34	2,5	10	8	M 12x1	10	19	8	22 000
SFAL 70x200 SFAL 70x250 SFAL 70x315	28	42	2,5	13	9	M 15x1	11	24	10	18 000
SFAL 80x200 SFAL 80x250 SFAL 80x315	33	48	3,2	16	10	M 20x1	12	27	12	17 000

Series SFAV

Belt-driven grinding spindle units

The dimensions of this design of grinding spindle are identical with those of the spindles of light series SFAL up to housing diameter 80 mm. However for reasons of reinforced execution it is suitable for major loads.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

- Flange (see also page 22 and 23)
- Belt pulley (see also page 22, 23 and 45)
- Balancing arbour for flange

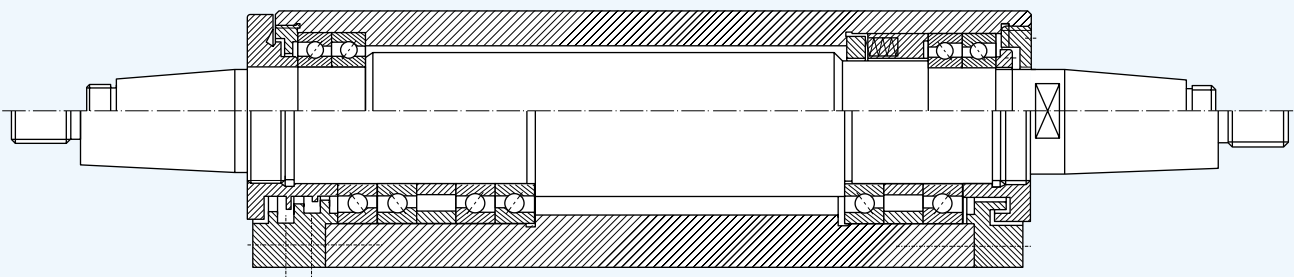
Lubrication

- For-life grease lubrication

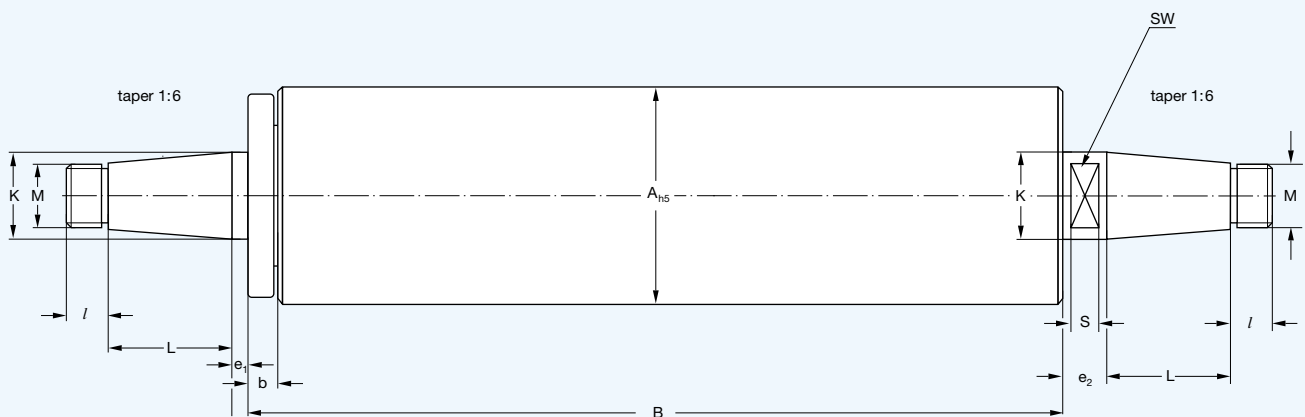
Sense of rotation

- Please indicate the sense of rotation always when placing an order

up to housing diameter 140 mm



from housing diameter 160 mm

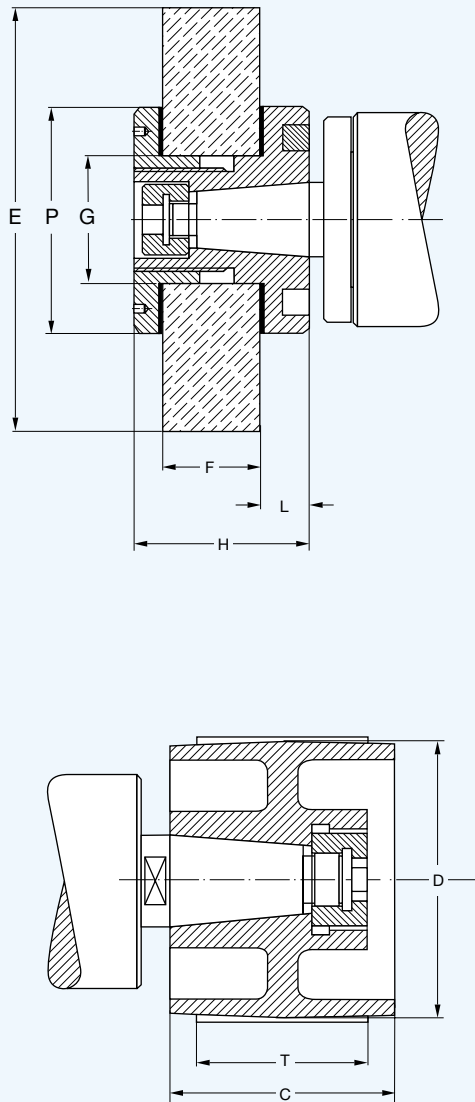


Grinding spindle A x B	Dimensions in mm									Speed max. min ⁻¹
	K	L	e ₁	e ₂	b	M	l	SW	S	
SFAV 40x160	13	20	2	7	7	M 8x1	7	11	6	30 000
SFAV 40x200										30 000
SFAV 40x250										30 000
SFAV 40x315										25 000
SFAV 50x160	15,5	24	2	8	8	M 10x1	8	13	6	25 000
SFAV 50x200										25 000
SFAV 50x250										25 000
SFAV 50x315										22 500
SFAV 60x110	22	34	2,5	10	8	M 12x1	10	19	8	20 000
SFAV 60x200										20 000
SFAV 60x250										20 000
SFAV 60x315										20 000
SFAV 60x400										18 000
SFAV 60x500										18 000
SFAV 70x200	28	42	2,5	13	9	M 15x1	11	24	10	18 000
SFAV 70x250										18 000
SFAV 70x315										18 000
SFAV 70x400										15 000
SFAV 70x500										15 000
SFAV 80x250	33	48	3,2	16	10	M 20x1	12	27	12	15 000
SFAV 80x315										15 000
SFAV 80x400										15 000
SFAV 80x500										12 500
SFAV 80x630										12 500
SFAV 100x315	43	63	3,2	16	10	M 25x1	14	36	14	13 000
SFAV 100x400										13 000
SFAV 100x500										13 000
SFAV 100x630										10 000
SFAV 100x800										10 000
SFAV 120x400	53	70	4	18	12	M 36x1,5	18	46	16	9 000
SFAV 120x500										9 000
SFAV 120x630										9 000
SFAV 120x800										8 000
SFAV 140x400	58	63	5	20		M 36x1,5	20	50	18	7 500
SFAV 140x500										7 500
SFAV 140x630										7 500
SFAV 160x400	68	80	4	23		M 40x1,5	20	60	20	7 000
SFAV 160x500										7 000
SFAV 160x630										6 000
SFAV 200x500	90	100	6	6		M 55x1,5	28	30	10	5 000
SFAV 200x630										5 000

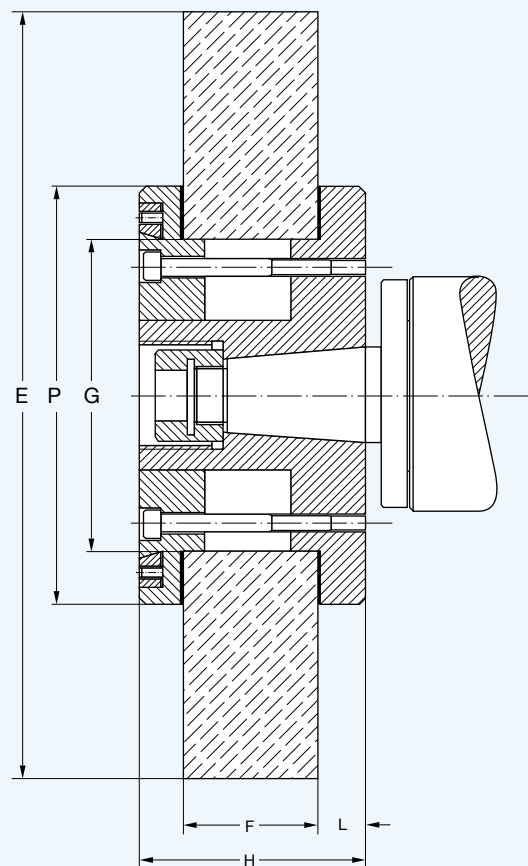
Accessories for Series SFAL / SFAV

The grinding wheel flanges are supplied with shims which also allow narrower grinding wheels to be chucked. Further diameters of belt pulleys see page 45.

up to housing diameter 120 mm



from housing diameter 140 mm



Spindle unit	Flange Designation	Grinding wheel						Range of applic.		Belt pulley				Speed min ⁻¹
		P mm	H	L	E mm	F	G	Bore mm	Depth mm	Designation	D mm	C	T	
SFAL 32	SA 00-20x31	31	24	4	50	16	20	40-60	1)	R 00-50x32	50	32	25	12 500
SFAL 40	SA 02-20x40	40	35	6	50	16	20	40-60	1)	R 02-80x40	80	40	32	7 800
SFAV 40	SA 02-32x48	48	38	8	80	25	32	60-90	1)					
SFAL 50	SA 03-32x58	58	43	11	100	25	32	70-110	1)	R 03-100x50	100	50	40	6 250
SFAV 50														
SFAL 60	SA 05-32x60	60	52	12	80	25	32	50-90	1)	R 05-100x63	100	63	50	6 250
SFAV 60	SA 05-51x69	69	52	12	100	32	51	80-130	1)					
SFAL 70	SA 06-51x79	79	62	14	125	40	51	90-160	1)	R 06-125x71	125	71	60	5 000
SFAV 70	SA 06-51x100	100	62	14	200	40	51	150-260	1)	R 06-200x71	200	71	60	3 150
SFAL 80	SA 07-51x89	89	74	15	125	50	51	100-190	1)	R 07-125x80	125	80	60	5 000
SFAV 80	SA 07-51x120	120	74	15	200	50	51	150-260	1)	R 07-200x80	200	80	60	3 150
SFAV 100	SA 09-76x99	99	85	15	160	50	76	120-210	1)	R 09-180x90	180	90	70	3 500
SFAV 100	SA 09-76x130	130	85	15	250	50	76	130-325	1)	R 09-125x90	125	90	70	2 500 ²⁾
SFAV 120	SA 11-76x120	120	100	19	200	63	76	150-260	1)	R 11-200x100	200	100	80	3 150
SFAV 120	SA 11-76x150	150	100	19	315	63	76	240-400	1)	R 11-160x100	160	100	80	1 950 ²⁾
SFAV 140	SA 12-127x185	185	110	20	450	70	127	500	1)	R 12-210x100	210	100	80	1 500
SFAV 140	SA 12-76x140	140	100	20	250	60	76	375	1)	R 12-120x100	120	100	80	2 620
SFAV 160	SA 14-203x260	260	124	22	500	80	203	700	1)	R 14-230x120	230	120	100	1 370
SFAV 200	SA 20-203x270	270	128	24	600	80	203	800	1)	R 20-280x130	280	130	100	1 120

¹⁾ Depth of grinding: B + L + el + 2/3 F - chucking length

Drive: Motor speed 2 860 min⁻¹

Motor belt pulley ø 220 mm

²⁾ Motor belt pulley ø 110 mm

Series SFAA

Belt-driven grinding spindle units

These spindles are suitable for grinding particularly deep holes which cannot be ground with any other spindle type.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

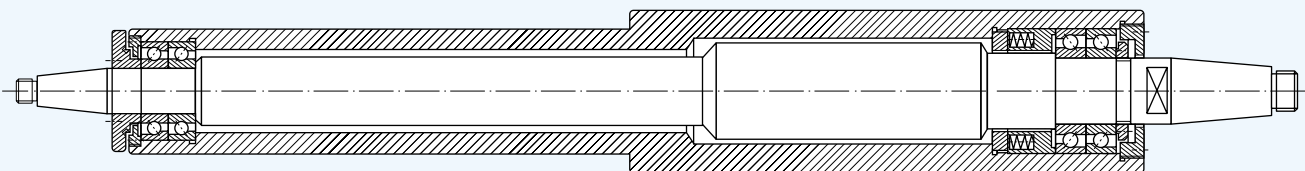
- Flange (see also page 26)
- Belt pulley (see also page 26 and 45)
- Balancing arbour for flange

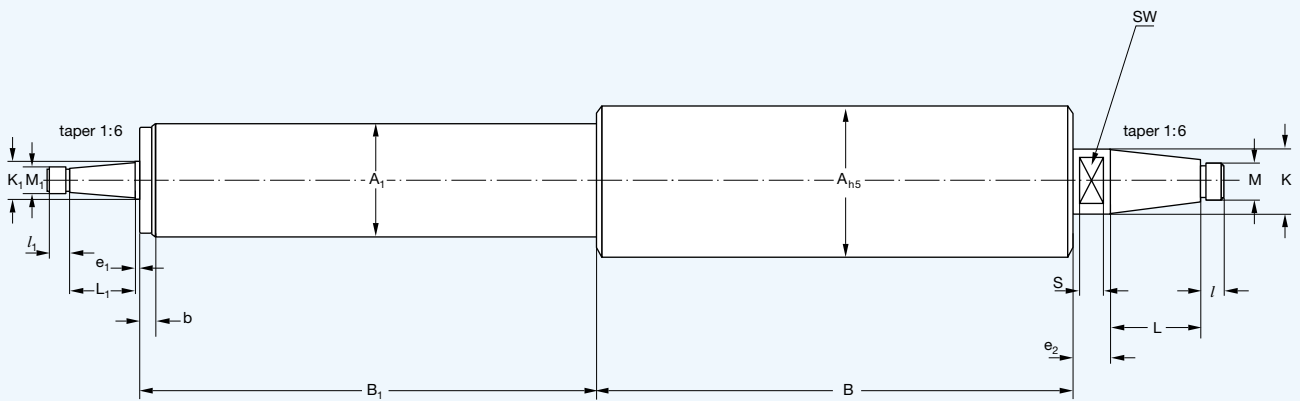
Lubrication

- For-life grease lubrication

Sense of rotation

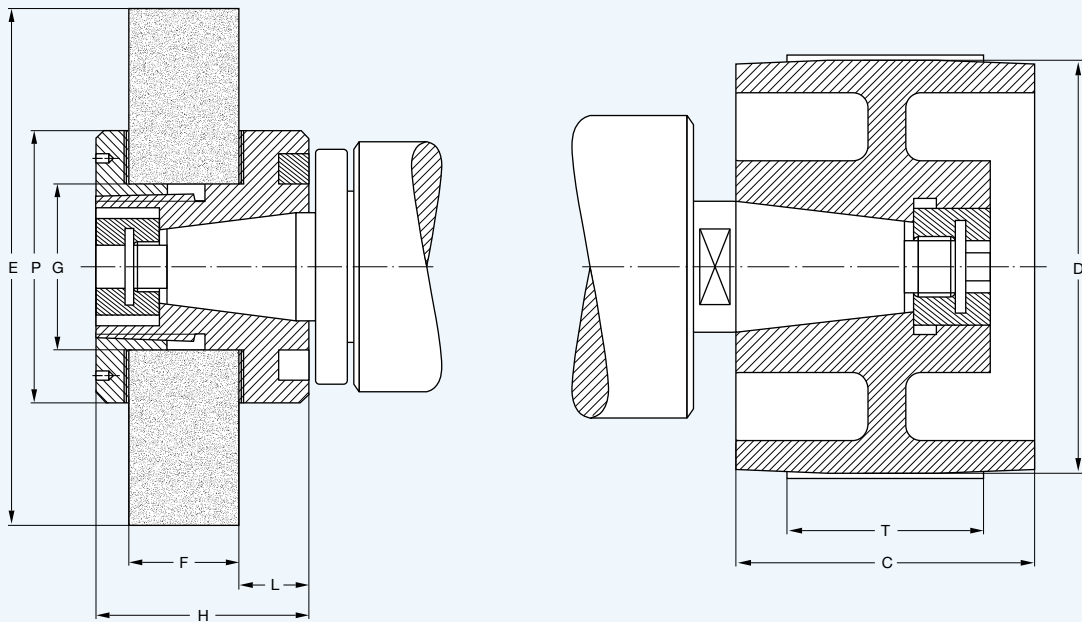
- Please indicate the sense of rotation always when placing an order





Grinding spindle type A x B - A ₁ x B ₁	Dimensions in mm													Speed max. min ⁻¹
	K	L	K ₁	L ₁	e ₁	e ₂	b	M	l	M ₁	l ₁	SW	S	
SFAA 60x250-50x160 SFAA 60x250-50x200 SFAA 60x250-50x250 SFAA 60x250-50x315	22	34	15,5	24	2	10	8	M 12x1	10	M 10x1	8	19	8	12 000
SFAA 80x250-60x200 SFAA 80x250-60x250 SFAA 80x250-60x315 SFAA 80x250-60x400	33	48	22	34	2	14	9	M 20x1	12	M 12x1	10	27	12	8 000
SFAA 100x315-80x315 SFAA 100x315-80x400 SFAA 100x315-80x500	43	63	33	48	3	16	10	M 25x1	14	M 20x1	12	36	14	6 000
SFAA 120x500-100x300	53	70	48	63	4	18	10	M 36x1,5	18	M 30x1	18	46	16	5 500

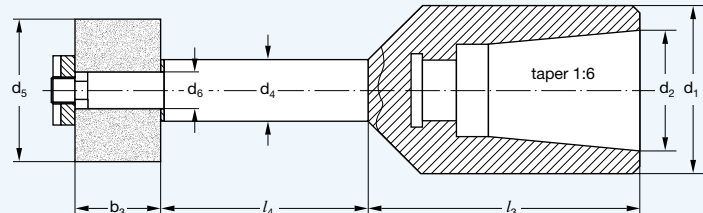
Accessories for Series SFAA



Spindle unit	Flange				Grinding wheel			Range of applic.		Belt pulley			Speed min ⁻¹	
	Designation	P mm	H mm	L mm	E mm	F mm	G mm	Bore mm	Depth mm	Designation	D mm	C mm		T mm
SFAA 60	SA 03-32x50	50	43	11	80	25	32	55-120	¹⁾	R 05-80x63	80	63	50	7 800
SFAA 80	SA 05-32x60	60	52	12	100	25	32	65-150	¹⁾	R 07-100x80	100	80	60	6 250
SFAA 100	SA 07-51x80	80	70	15	125	32	51	85-180	¹⁾	R 09-125x90	125	90	70	5 000
SFAA 120	SA 10-76x130	130	60	15	300	30	76	200-380	¹⁾	R 11-160x100	160	100	80	2 040

¹⁾ Depth of grinding: $B_1 + e_1 + L + 2/3F$ - chucking length

Grinding wheel carriers for spindle with male taper



Grinding wheel carriers for SAI for grinding small bores

Grinding spindle Type	Grinding wheel carriers with slotted circular nut Designation	Dimensions in mm					Grinding wheel Dimensions mm			Range for application mm	
		d ₁	d ₂	d ₄	l ₃	l ₄	d ₅	b ₃	d ₆	Bore bis	Depth
SFAL 40	SAI 02-6x36	19	12,9	6	40	36	13	6	4	20	40
SFAV 40	SAI 02-8x48	19	12,9	8	40	48	13	13	4	20	56
SSA 50	SAI 02-10x60	19	12,9	10	40	60	20	13	6	30	68
SFAL 60 SFAV 60	SAI 05-7x25	34	22	7	60	25	13	6	4	20	30
	SAI 05-7x50	34	22	7	60	50	13	13	4	20	58
	SAI 05-12x50	34	22	12	60	50	20	13	6	30	58
	SAI 05-12x75	34	22	12	60	75	20	13	6	30	84
	SAI 05-14x63	34	22	14	60	63	32	13	10	45	72
	SAI 05-14x93	34	22	14	60	93	32	13	10	45	100
	SAI 05-18x78	34	22	18	60	78	40	13	13	60	86
SAI 05-18x117	34	22	18	60	117	40	20	13	60	130	
SFAL 70 SFAV 70 SSA 80	SAI 06-15x60	42	28	15	68	60	32	13	10	45	68
	SAI 06-19x35	42	28	19	68	35	40	10	13	60	42
	SAI 06-19x105	42	28	19	68	105	40	16	13	60	116
	SAI 06-23x120	42	28	23	68	120	40	25	13	60	136
SFAL 80 SFAV 80	SAI 07-16x70	46	33	16	75	70	32	13	10	45	78
	SAI 07-20x86	46	33	20	75	86	40	16	13	60	98
	SAI 07-20x129	46	33	20	75	129	40	20	13	60	140
	SAI 07-25x108	46	33	25	75	108	50	20	16	70	120
	SAI 07-25x162	46	33	25	75	162	50	25	16	70	180

Series SSV

Grinding spindles with an extended spindle shaft for grinding small, deep holes

When selecting these spindles please be sure to take one with a short shaft to ensure optimum rigidity.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut for fastening the belt pulley
- Operating instructions

Please order accessories separately

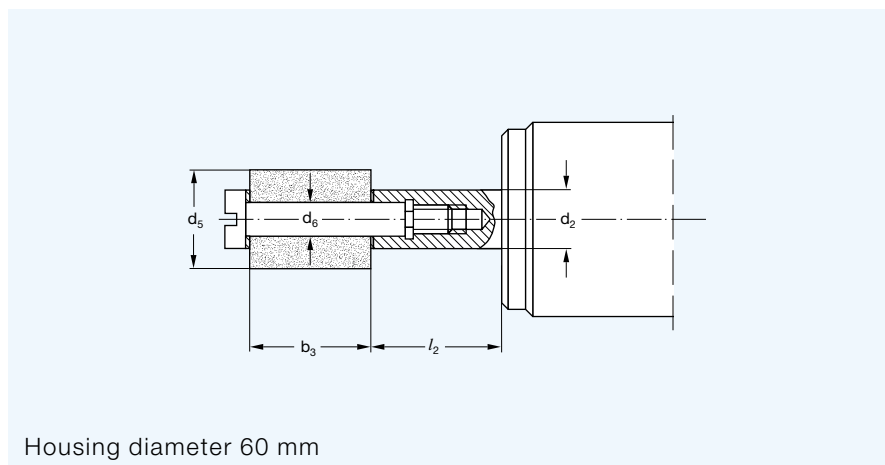
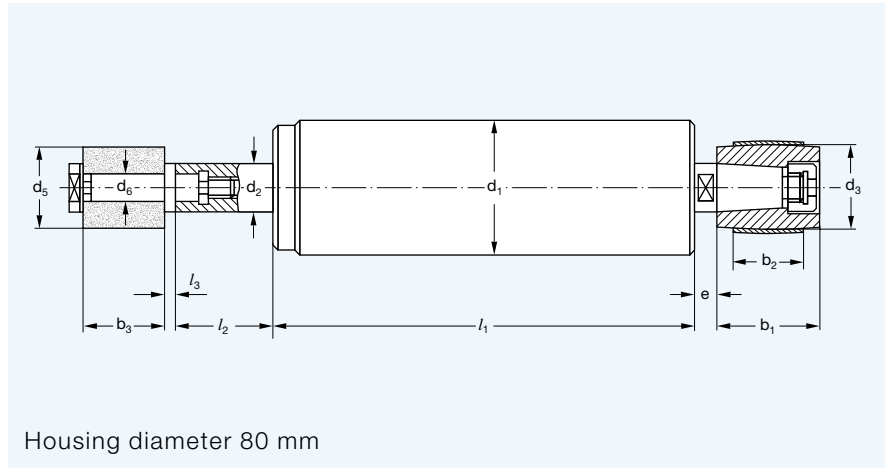
- Screw-in mandrel
- Belt pulley (see also page 45)

Lubrication

- For-life grease lubrication

Sense of rotation

- Please indicate the sense of rotation always when placing an order



Grinding spindle		Dimensions mm				max. speed min ⁻¹	Screw-in mandrel Designation	mm <i>l</i> ₃	Grinding wheel Dimensions mm			Range of application mm	
Type <i>d</i> ₁ × <i>l</i> ₁ - <i>d</i> ₂ × <i>l</i> ₂	Number (engraved)	e	Belt pulley						<i>l</i> ₃	<i>d</i> ₅	<i>b</i> ₃	<i>d</i> ₆	Bore up to
			<i>d</i> ₃	<i>b</i> ₁	<i>b</i> ₂								
SSV 60x250-18x40/3	1.6-4-1/3	8	32	63	50	20 000	SV 04-10x40	-	32	40	10	48	65
SSV 60x250-18x63/3	1.6-4-2/3												85
SSV 60x250-18x80/3	1.6-4-3/3												105
SSV 60x315-18x40/3	1.6-5-1/3	8	32	63	50	20 000	SV 04-10x40	-	32	40	10	48	65
SSV 60x315-18x63/3	1.6-5-2/3												85
SSV 60x315-18x80/3	1.6-5-3/3												105
SSV 80x250-28x63/3	1.8-4-1/3	13	50	80	60	14 000	SV 06-16x50	5	50	50	16	75	95
SSV 80x250-28x80/3	1.8-4-2/3												110
SSV 80x250-28x100/3	1.8-4-3/3												130
SSV 80x250-28x125/3	1.8-4-4/3												155
SSV 80x315-28x63/3	1.8-5-1/3	13	50	80	60	14 000	SV 06-16x50	5	50	50	16	75	95
SSV 80x315-28x80/3	1.8-5-2/3												110
SSV 80x315-28x100/3	1.8-5-3/3												130
SSV 80x315-28x125/3	1.8-5-4/3												155

Series SSI / SSB

Grinding spindles with female taper for grinding small bores

This universal spindle type can be used for all kinds of bore grinding tasks. The large number of screw-in mandrels allows an optimum adaptation to every grinding task.

For 100 mm OD housings, the mandrels are inserted into a cylindrical bore and fastened by means of a threaded pin. This does not only ensure that the unit can be easily dismantled but also provides a better radial runout of the mounted mandrel (cf. abutment-dimensions table, page 46).

When selecting the mandrels, please be sure to take short and sturdy shafts.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut for fastening the belt pulley
- A threaded pin for fastening the screw-in mandrel (for spindle type SSB)
- Operating instruction

Please order accessories separately

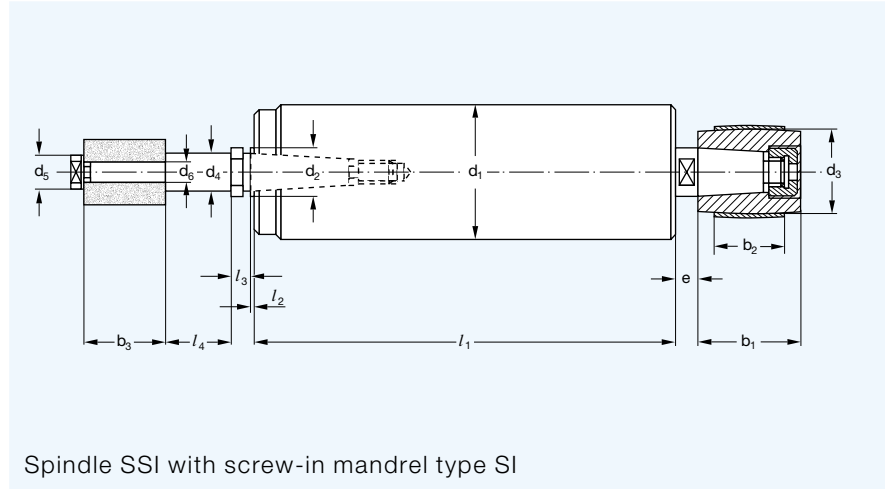
- Screw-in mandrel
- Belt pulley (see also page 45)

Lubrication

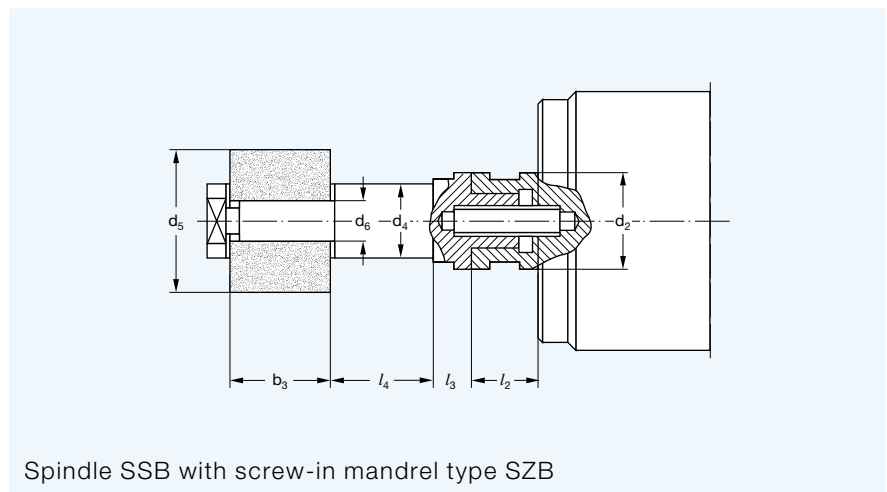
- For-life grease lubrication

Sense of rotation

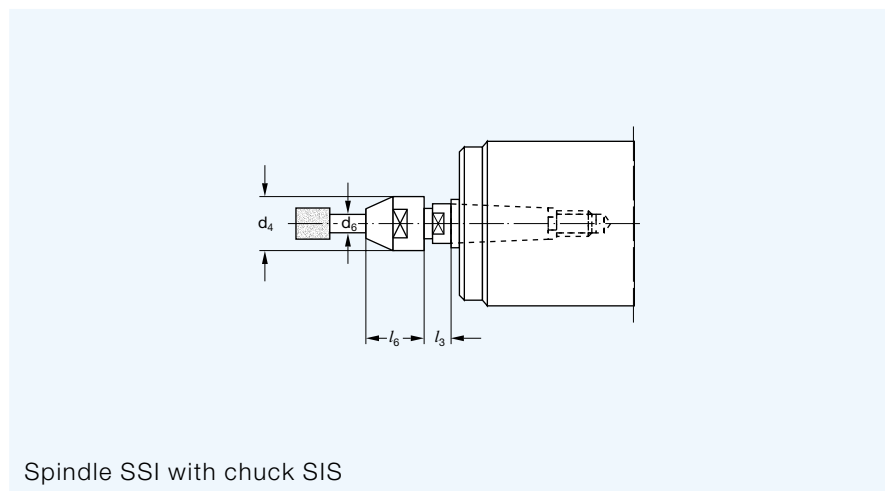
- Please indicate the sense of rotation always when placing an order



Spindle SSI with screw-in mandrel type SI



Spindle SSB with screw-in mandrel type SZB



Spindle SSI with chuck SIS

Grinding spindle		Dimensions mm						max. speed min ⁻¹	Screw-in mandrel/Chuck			Grinding wheel			Range of application mm		
Type d ₁ x l ₁	Number (engraved)	Shaft			Belt pulley				Designation	Dimensions mm			Dimensions mm			Bore up to	Depth
		d ₂	l ₂	e	d ₃	b ₁	b ₂			d ₄	l ₄	l ₃	d ₅	b ₃	d ₆		
SSI 40x160/2 SSI 40x200/2 SSI 40x250/2	2.4-2/2 2.4-3/2 2.4-4/2	11	1,6	6	25	40	32	32 000	SIK 01-6x20	6	20	7	10	13	3	15	25
	SI 01-9x20								9	20	16		20	6	24	30	
	SI 01-9x32									32					42		
	SIS 01-3								13	22				3	12		
	SIS 01-6								19	26				6	24		
SSI 50x160/2 SSI 50x200/2 SSI 50x250/2 SSI 50x315/2	2.5-2/2 2.5-2/3 2.5-4/2 2.5-5/2	13	2	7	32	50	40	25 000	SIK 02-6x20	6	20	7	10	13	3	15	25
	SI 02-9x20								9	20	16		20	6	24	30	
	SI 02-9x32									32					42		
	SI 02-11x32								11	32	20		25	6	30	45	
	SI 02-11x50									50					65		
	SIS 02-3								13	22				3	12		
	SIS 02-6								19	26				6	24		
SSI 60x200/3 SSI 60x250/2 SSI 60x315/2	2.6-3/3 2.6-4/3 2.6-5/3	18	2	8	32	63	50	20 000	SI 04-9x32	9	32	8	16	20	6	24	42
	SI 04-9x50									50					60		
	SI 04-11x32								11	32	20		25	6	30	45	
	SI 04-11x60									60					72		
	SI 04-13x40								13	40	25		32	8	38	60	
	SI 04-13x80									80					100		
	SIS 04-3								19	26				3	12		
SIS 04-6					6	24											
SSI 80x250/3 SSI 80x315/3 SSI 80x400/3	2.8-4/3 2.8-5/3 2.8-7/3	28	2,5	13	40	80	60	14 000	SI 06-13x40	13	40	12	25	32	8	38	60
	SI 06-13x80									80					100		
	SI 06-18x60								18	60	32		40	10	48	85	
	SI 06-18x100									100					125		
	SI 06-22x40									40	40		50	13	60	70	
	SI 06-22x80								22	80					110		
SI 06-22x125		125				155											
SSB 100x250 SSB 100x315 SSB 100x400 SSB 100x500		38	28	16	63	100	80	10 000	SZB 08-22x40		40	14				60	70
	SZB 08-22x80								22	80	40		50	13	75	110	
	SZB 08-22x125									125					155		
	SZB 08-28x40									40					70		
	SZB 08-28x80								28	80	50		50	16	110		
	SZB 08-28x125									125					155		
	SZB 08-38x40									40	63		50	20	95	80	
	SZB 08-38x60									60					100		
	SZB 08-38x80									80					120		
	SZB 08-38x100								38	100	63		50	20	95	140	
SZB 08-38x140		140				180											

Note: Screw-in mandrel · Type SIK is without nut - grinding wheel is cemented · Type SIS are chucks for grinding sticks

Series SSA

Grinding spindles with male taper for grinding deep bores and for external grinding

Grinding spindle for deep holes whose diameters are wider than that of the spindle.

Flanges for a housing outside diameter from 60 mm have counterbalance weights for accurately balancing the grinding wheels.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

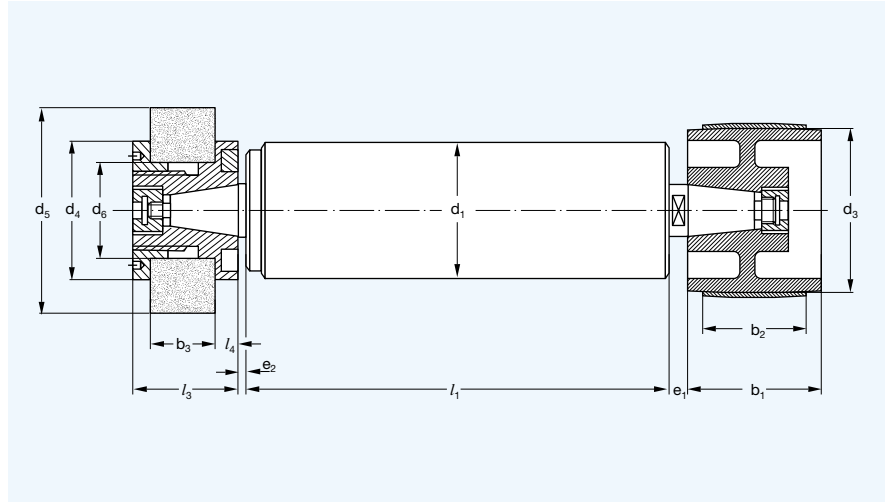
- Flange
- Belt pulley
- Balancing arbour for flange

Lubrication

- For-life grease lubrication

Sense of rotation

- Please always indicate the sense of rotation in your order



Grinding spindle		Dimensions mm					max. speed min ⁻¹	Dimensions mm						Range of application mm		
Type d ₁ x l ₁	Number (engraved)	e ₂	e ₁	Belt pulley				Flange			Grinding wheel			Bore up to	Depth	
				d ₃	b ₁	b ₂		Designation	d ₄	l ₄	l ₃	d ₅	b ₃			d ₆
SSA 40x160/2	3.4-2/2	1,6	6	63	40	32	32 000	SA 01-25x38	38	32	6	63	20	25	50-70	
SSA 40x200/2	3.4-3/2															
SSA 40x250/2	3.4-4/2															
SSA 40x315/2	3.4-5/2															22 000
SSA 50x160/2	3.5-2/2	2	7	80	50	40	25 000	SA 02-32x48	48	38	8	80	25	32	60-90	
SSA 50x200/2	3.5-3/2															
SSA 50x250/2	3.5-4/2															
SSA 50x315/2	3.5-5/2															22 500
SSA 60x200/3	3.6-3/3	2	8	100	63	50	20 000	SA 04-32x58	58	42	11	100	25	32	70-110	
SSA 60x250/3	3.6-4/3															
SSA 60x315/3	3.6-5/3															
SSA 60x400/3	3.6-7/3															
SSA 60x500/3	3.6-9/3															18 000
SSA 80x160/3	3.8-2/3	2,5	13	100	80	60	14 000	SA 06-51x79	79	60	14	125	40	51	90-160	
SSA 80x250/3	3.8-4/3															
SSA 80x315/3	3.8-5/3															
SSA 80x400/3	3.8-7/3															
SSA 80x450/3	3.8-8/3															
SSA 80x500/3	3.8-9/3															
SSA 80x630/3	3.8-11/3															
SSA 80x700/3	3.8-12/3															
SSA 80x800/3	3.8-13/3															12 500
SSA 100x315/3	3.10-5/3															3,2
SSA 100x400/3	3.10-7/3															
SSA 100x500/3	3.10-9/3															
SSA 100x630/3	3.10-11/3															
SSA 100x800/3	3.10-13/3															
SSA 100x850/3	3.10-14/3	9 000														
SSA 125x400/3	3.12-7/3	4	18	125	125	100	8 000	SA 10-76x124	124	86	17	200	50	76	135-300	
SSA 125x500/3	3.12-9/3															
SSA 125x630/3	3.12-11/3															
SSA 125x800/3	3.12-13/3															7 500 6 000

$$l_{\max} = l_1 + e_2 + l_4 + \frac{2}{3}b_3 - \text{chucking length}$$

The grinding wheel flanges are supplied with shims which also allow narrower grinding wheels to be chucked.
SSA 70x250: please inquire.

Series O-SSA

Grinding spindles with male taper for external grinding, internal grinding and face grinding

This spindle type is suitable for external grinding, and particularly well for face grinding. The rigidity of the bearing arrangement has been increased compared to that of the SSA spindles. The precision bearings which are used have a larger contact angle. They can also accommodate major axial loads. These spindles are used where particularly high radial and axial loads have to be accommodated.

The flange design is identical with that of the spindle series SSA.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

- Flange
- Belt pulley (see also page 45)
- Balancing arbour for flange

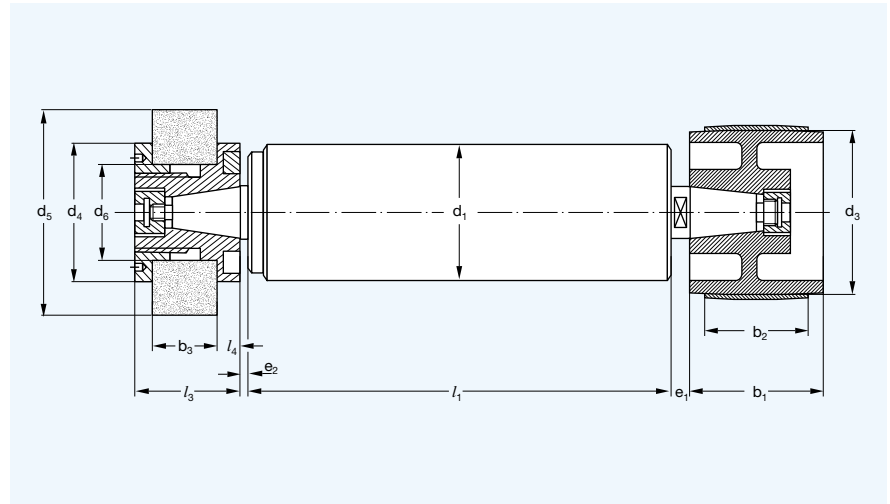
Lubrication

- For-life grease lubrication

Sense of rotation

- Please always indicate the sense of rotation in your order

The grinding wheel flanges are supplied with shims so that narrower grinding wheels can also be mounted.



Grinding spindle		Dimensions mm					max. speed min ⁻¹	Dimensions mm						Range of application mm	
Type $d_1 \times l_1$	Number (engraved)	e_2	e_1	Belt pulley		Designation		Flange			Grinding wheel			Bore	Depth
				d_3	b_1		b_2	d_4	l_4	l_3	d_5	b_3	d_6		
O-SSA 40x160/2	5.4-2/2	1,6	6	63	40	32	15 000	SA 01-25x38	38	32	6	63	20	25	50-70
O-SSA 40x200/2	5.4-3/2														
O-SSA 40x250/2	5.4-4/2														
O-SSA 40x315/2	5.4-5/2														
O-SSA 50x160/2	5.5-2/2	2	7	80	50	40	11 000	SA 02-32x48	48	38	8	80	25	32	60-90
O-SSA 50x200/2	5.5-3/2														
O-SSA 50x250/2	5.5-4/2														
O-SSA 50x315/2	5.5-5/2														
O-SSA 60x250/4	5.6-4/4	2	8	100	63	50	9 000	SA 04-32x58	58	42	11	100	25	32	70-110
O-SSA 60x315/4	5.6-5/4														
O-SSA 60x400/4	5.6-7/4														
O-SSA 80x250/4	5.8-4/4	2,5	13	100	80	70	7 000	SA 06-51x79	79	60	14	125	40	51	90-160
O-SSA 80x315/4	5.8-5/4														
O-SSA 80x400/4	5.8-7/4														
O-SSA 100x315/4	5.10-5/4	3,2	16	125	100	80	5 000	SA 08-76x99	99	75	15	160	50	76	110-230
O-SSA 100x400/4	5.10-7/4														
O-SSA 100x500/4	5.10-9/4														
O-SSA 125x400/4	5.12-7/4	4	18	125	125	90	4 000	SA 10-76x124	124	85	17	200	50	76	135-300
O-SSA 125x500/4	5.12-9/4														

$$l_{\max} = l_1 + e_2 + l_4 + \frac{2}{3}b_3 - \text{chucking length}$$

O-SSA 70x250: please inquire.

Series SPV

Precisions grinding spindles for higher speeds

These spindles permit grinding at speeds which could so far be reached only by electric grinding spindles. SPV spindles provide a considerably higher grinding accuracy. Precision angular contact ball bearings of precision class P2S are used which provide particularly good rigidity.

To be able to fully utilize this precision in the grinding process, screw-in mandrels are used which are fastened by means of a threaded pin (with a housing diameter from 80 mm). This new fastening system guarantees utmost radial runout of the screw-in mandrel.

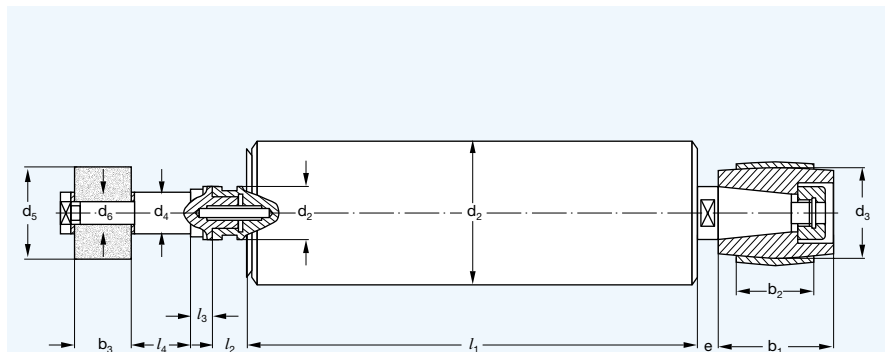
Except for in-series production, these spindles are recommended for applications where the use of electric grinding spindles has not yet become cost-effective. To obtain a good belt pulley transmission ratio, the drive unit should be fitted with medium-frequency motors.

The order includes

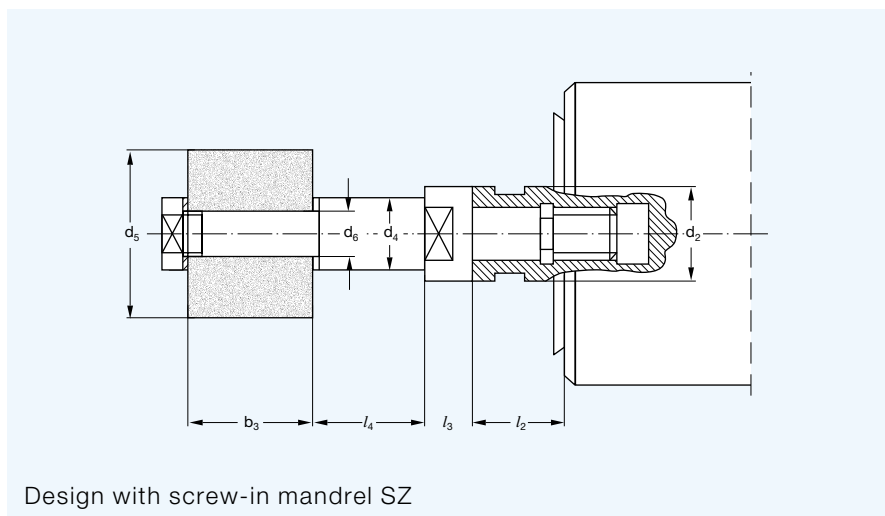
- Tool for mounting the spindle
- One hexagon socket nut for fastening the belt pulley
- A threaded pin for fastening the screw-in mandrel used with SZV
- Operating instructions

Please order accessories separately

- Screw-in mandrel
- Belt pulley (see also page 45)



Design with screw-in mandrel SZV



Design with screw-in mandrel SZ

Lubrication

- For-life grease lubrication

Sense of rotation

- Please indicate always the sense of rotation when placing an order

Grinding spindle		Dimensions mm					max. speed min ⁻¹	Screw-in mandrel			Grinding wheel			Range of application mm		
Type d ₁ x l ₁ -d ₂	Number (engraved)	l ₂	e	Belt pulley		Designation		Dimensions mm			Dimensions mm			Bore to	max. depth	
				d ₃	b ₁		b ₂	d ₄	l ₄	l ₃	d ₅	b ₃	d ₆			
SPV 50x160-13/3	9.5-2.2/3	12	7	28	40	20	38 000	SZK 02-6x16	6	16	8	13	13	4	20	25
								SZ 02-9x10	9	10		16	16	6	24	20
								SZ 02-9x25	9	25	16	16	6	24	35	
								SK 02-13x16	13	16	*	20	20	6	30	34
SPV 60x250-15/3	9.6-4.3/3	12	7	32	40	20	33 000	SK 02-13x32	13	32	*	20	20	6	30	50
								SK 03-9x10	9	10	9	16	16	6	24	20
								SZ 03-9x20	9	20		16	16	6	24	30
								SZ 03-12x16	12	16	20	20	6	30	40	
								SZ 03-12x32	12	32	20	20	6	30	46	
								SZ 03-15x20	15	20	*	25	25	8	38	42
SPV 60x250-18/3	9.6-4.4/3	14	8	40	50	40	27 000	SZ 03-15x40	15	40	*	25	25	8	38	62
								SZ 04-9x10	9	10	10	20	20	6	30	24
								SZ 04-9x25	9	25		20	20	6	30	40
								SZ 04-13x20	13	20	25	25	8	38	36	
								SZ 04-13x32	13	32	25	25	8	38	48	
								SZ 04-18x25	18	25	*	32	32	10	48	55
SPV 80x250-23/3	9.8-4.5/3	16	10	50	63	40	21 000	SZ 04-18x40	18	40	*	32	32	10	48	70
								SZV 05-13x16	13	16	10	25	25	8	38	32
								SZV 05-13x32	13	32		25	25	8	38	48
								SZV 05-18x20	18	20	32	32	10	48	40	
								SZV 05-18x40	18	40	32	32	10	48	60	
								SZV 05-23x32	23	32	*	40	40	13	60	68
SPV 80x250-28/3	9.8-4.6/3	20	13	50	71	40	19 000	SZV 05-23x50	23	50	*	40	40	13	60	86
								SZV 06-18x20	18	20	10	32	32	10	48	40
								SZV 06-18x40	18	40		32	32	10	48	60
								SZV 06-22x32	22	32	40	32	13	60	54	
								SZV 06-22x50	22	50	40	32	13	60	72	
								SZV 06-28x40	28	40	*	40	40	16	68	78
SPV 100x315-33/3	9.10-5.7/3	25	14	63	80	50	16 000	SZV 06-28x63	28	63	*	40	40	16	68	100
								SZV 07-22x32	22	32	12	40	32	13	60	54
								SZV 07-22x50	22	50		40	32	13	60	72
								SZV 07-28x40	28	40	50	40	16	68	68	
								SZV 07-28x63	28	63	50	40	16	68	90	
								SZV 07-33x50	33	50	*	50	50	20	75	95
SPV 100x315-38/3	9.10-5.8/3	28	16	71	90	50	13 500	SZV 07-33x80	33	80	*	50	50	20	75	125
								SZV 08-22x32	22	32	14	40	40	13	60	60
								SZV 08-22x50	22	50		40	40	13	60	78
								SZV 08-28x40	28	40	50	40	16	75	68	
								SZV 08-28x63	28	63	50	40	16	75	90	
								SZV 08-38x50	38	50	*	63	50	20	95	100
SPV 125x315-48/3	9.12-5.10/3	32	18	80	100	50	12 000	SZV 08-38x80	38	80	*	63	50	20	95	130
								SZV 10-28x40	28	40	16	50	40	16	75	68
								SZV 10-28x63	28	63		50	40	16	75	90
								SZV 10-35x50	35	50	63	50	20	95	85	
								SZV 10-35x80	35	80	63	50	20	95	115	
								SZV 10-48x63	48	63	*	80	50	32	120	120
SZV 10-48x100	48	100	*	80	50	32	120	160								

Please note: Screw-in mandrels of type SZK have no nut, the grinding wheel is cemented on. * These screw-in mandrels are not stepped (d₄ = d₂).

Series SPA

Precision grinding spindles with male taper for grinding deep bores and for external grinding

These grinding spindles provide a greater grinding accuracy than the SSA spindles. Precision ball bearing of precision class P2S are used. Special care has to be taken that the grinding wheels are carefully balanced.

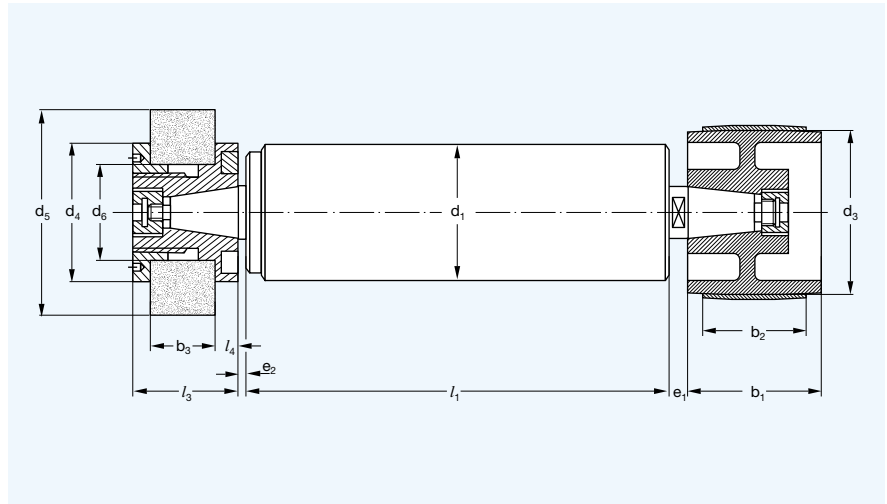
The grinding wheel flanges are supplied with shims so that narrower grinding wheels can also be mounted.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

- Flange
- Belt pulley (see also page 45)
- Balancing arbour for flange



Lubrication

- For-life grease lubrication

Sense of rotation

- Please always indicate the sense of rotation in your order

Grinding spindle		Dimensions mm					max. speed min ⁻¹	Dimensions mm						Range of application mm		
Type d ₁ x l ₁	Number (engraved)	e ₂	e ₁	Belt pulley		Flange			Grinding wheel			Bore up to	Depth			
				d ₃	b ₁	b ₂	Designation	d ₄	l ₃	l ₄	d ₅			b ₃	d ₆	
SPA 60		Please inquire														
SPA 60		Please inquire														
SPA 100x315/2	11.10-5/2	3,2	16	125	100	80	12 000	SA 08-76x99	99	75	15	160	50	76	110-230	l _{max} = l ₁ + e ₂ + l ₄ + 2/3 b ₃ - chucking length
SPA 100x400/2	11.10-7/2			200				SA 08-76x130	130			250				
SPA 125x400/2	11.12-7/2	4	18	125	125	100	10 000	SA 10-76x124	124	86	17	200	50	76	135-300	
				200				SA 10-76x150	150			315				

Series SPAZ

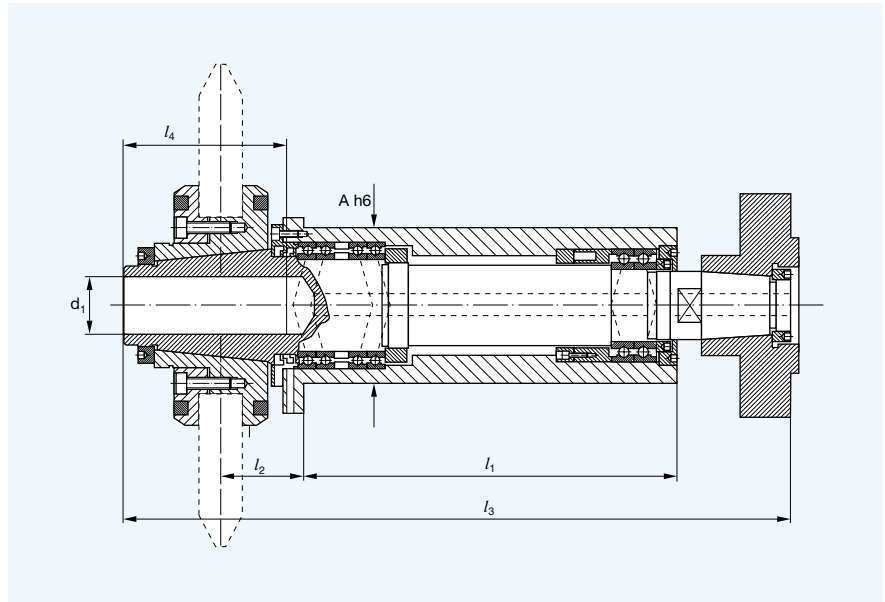
Tooth-flank precision grinding spindles

Tooth-flank grinding spindles are spindles of highest precision.

They fulfil specific requirements

- Zero clearance
- Deviation of radial runout and face runout (drive end) 0,001 mm
- High radial and axial stiffness
- Minimized excessive temperature rise and
- Minimized shaft elongation in action

All tooth-flank grinding spindles are fitted with high-speed resp. hybrid-spindle bearings of tolerance class ABEC 9. Spindle units fitted with hybrid-spindle bearings are provided for high-speed machining. The spindle units are driven by Poly-V-belt drive.



Tooth-flank grinding spindles, equipped for insert of built-in balance apparatus

Type	Speed max. min ⁻¹	ΔT ü. RT K	Main dimensions in mm						Grinding wheel Dimensions in mm		
			A h6	l_1	l_2	l_3	d_1	l_4	D_i	D_a	B
SPAZ 110-708/21 ¹⁾	3 200	6	110	270	61	486	42	120	127	350	25; 32
SPAZ 125-664/22 ¹⁾	3 200	6	125	425	85	642,5	50	130	127	350	25; 32; 35; 40; 50; 63

Tooth-flank grinding spindles, clockwise or counter-clockwise rotation

Type	Speed max. min ⁻¹	ΔT ü. RT K	Main dimensions in mm				Grinding wheel Dimensions in mm		
			A h6	l_1	l_2	l_3	D_i	D_a	B
SPAZ 100-605/2 ²⁾	3 200	8 ³⁾	100	340	32 35	492	127 90	350	32
SPAZC 100-605/2 ²⁾ (Hybridlagerung)	9 000	10	100	340	–	492	–	–	– ⁴⁾
SPAZ 110-611/1	3 200	8 ³⁾	110	270	57	477	127	350	25; 32
SPAZ 125-634/1	3 200	8 ³⁾	125	425	65	632	127	350	25; 32; 40; 50; 63

¹⁾ Spindle units for clockwise and counter-clockwise rotation

³⁾ excessive temperature rise, measured at $n = 2\,400 / 2\,200 \text{ min}^{-1}$

²⁾ SPAZ 100: Spindle housing without flange

⁴⁾ special CBN-Grinding wheel with special flange

Series IAO / SSST

Face grinding spindles

These spindles are intended specially for the face grinding attachments of internal grinding machines.

The order includes

- Tool for mounting the spindle
- One nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

- Flange
- Belt pulley (see also page 45)
- Flange balancing arbour (only for SSST 200/2)

Lubrication

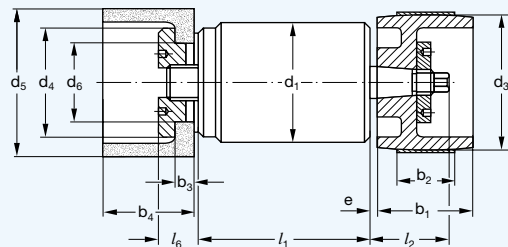
- For-life grease lubrication

Sense of rotation

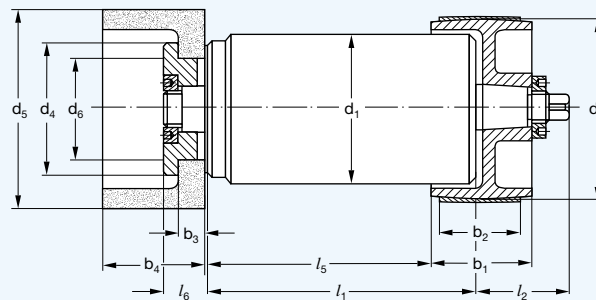
- Please always indicate the sense of rotation in your order

Order designation of belt pulleys

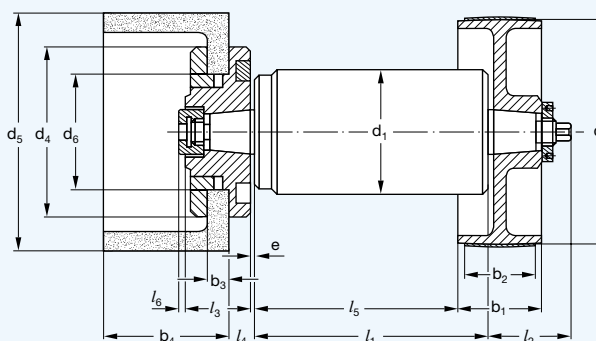
IAO/1	RSo 02 - 56 x 40
SSST 125/1	RSo 05 - 90 x 50
SSST 200/2	RSo 06 - 142 x 52



IAO/1



SSST 125/1



SSST 200/2

Grinding spindle	Main dimensions mm						Belt pulley mm			max. speed min ⁻¹	Flange			Grinding wheel mm					
	Type	d ₁	l ₁	l ₂	l ₅	l ₆	e	d ₃	b ₁		b ₂	Designation	d ₄	l ₃	l ₄	d ₅	b ₄	d ₆	b ₃
IAO/1		50	70	32	-	14	2	56	40	32	11 000	IAO/1 : 15	46	-	-	63 ¹⁾	40	32	8
SSST 125/1		75	135	45	113	21	-	90	50	40	15 000	SSST 125/1 : 15	66	-	-	100 ¹⁾	63	51	10
SSST 200/2		80	150	50	130	5	2	142	52	40	12 500	SSST 200/2-76x110	110	45	18	160 ¹⁾	80	76	16

¹⁾ Cup wheel (types 140 and 142), external dimensions indicated above the line, internal dimensions below the line.

Series SSAA

Grinding spindles with male taper and stepped spindle housing for grinding deep bores

These spindles are suitable for grinding particularly deep holes which cannot be ground with any other spindle type. The flange design is identical with those of the spindles of series SSA, but the d_1 of series SSA is here designated d_2 .

The order includes

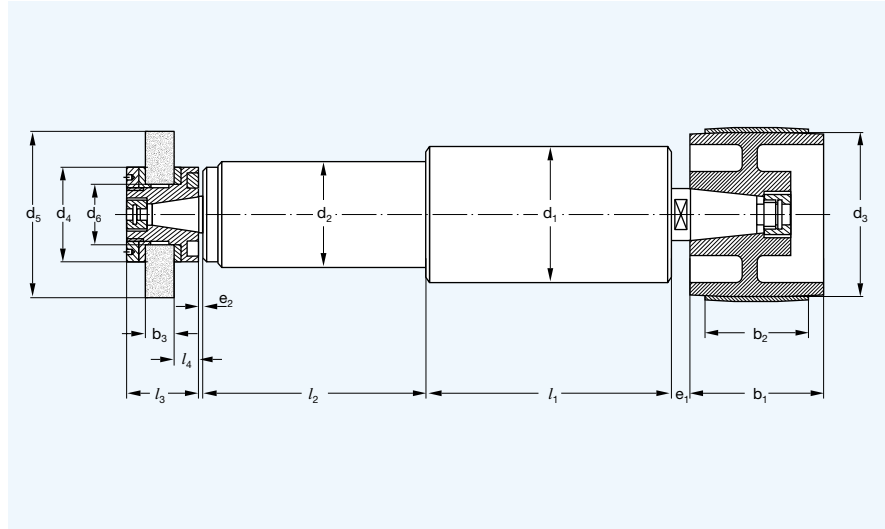
- Tools for mounting the spindle
- One hexagon socket nut each for fastening the belt pulley and the flange
- Operating instructions

Please order accessories separately

- Flange
- Belt pulley (see also page 45)
- Flange balancing arbour

Lubrication

- For-life grease lubrication



Sense of rotation

- Please always indicate the sense of rotation in your order

The grinding wheel flanges are supplied with shims which also allow narrower grinding wheels to be chucked.

Grinding spindle		Dimensions mm					max. speed min ⁻¹	Dimensions mm						Range of application mm		
Type $d_1 \times l_1 - d_2 \times l_2$	Number (engraved)	e_2	e_1	Belt pulley d_3 b_1 b_2				Flange Designation d_4 l_3 l_4			Grinding wheel d_5 b_3 d_6			Bore	Depth	
SSAA 60x250-50x160/3	4.6-4-2/3	2	8	80	63	50	10 000	SA 02-32x48	48	38	8	80	25	32	60-90	$l_{max} = l_1 + e_2 + l_4 + \frac{2}{3}b_3 - \text{chucking length}$
SSAA 60x250-50x200/3	4.6-4-3/3															
SSAA 60x250-50x250/3	4.6-4-4/3															
SSAA 60x250-50x315/3	4.6-4-5/3															
SSAA 80x250-60x250/3	4.8-4-4/3	2	13	100	80	60	7 000	SA 04-32x58	58	42	11	100	25	32	70-100	
SSAA 80x250-60x315/3	4.8-4-5/3															
SSAA 80x250-60x400/3	4.8-4-7/3															
SSAA 80x315-60x200/3	4.8-5-3/3	2	13	100	80	60	7 000	SA 04-32x58	58	42	11	100	25	32	70-100	
SSAA 80x315-60x250/3	4.8-5-4/3															
SSAA 80x315-60x315/3	4.8-5-5/3															
SSAA 80x315-60x400/3	4.8-5-7/3															

Series MNFA

Motor grinding spindles

The motor grinding spindle is a complete, multi-purpose unit for external grinding, internal grinding, face grinding and surface grinding. The fact that both the spindle and the drive unit are mounted on the same shaft, and the use of precision ball bearings of tolerance class P2S, guarantee an extreme quietness of running and thus optimum grinding results.

All spindles are suitable for clockwise rotation and counter-clockwise rotation. The sense of rotation can be altered by reversing the poles of the electrical connection.

The units are driven by three-phase asynchronous motors to which they are connected via the terminal box of the motor. The speed of motor can be adjusted on working with a frequency transformer.

The order includes

- Tool for mounting the spindle
- One hexagon socket nut for fastening the flange
- Operating instructions

Please order accessories separately

- Flange (see also page 44)
- Balancing arbour for flange

Lubrication

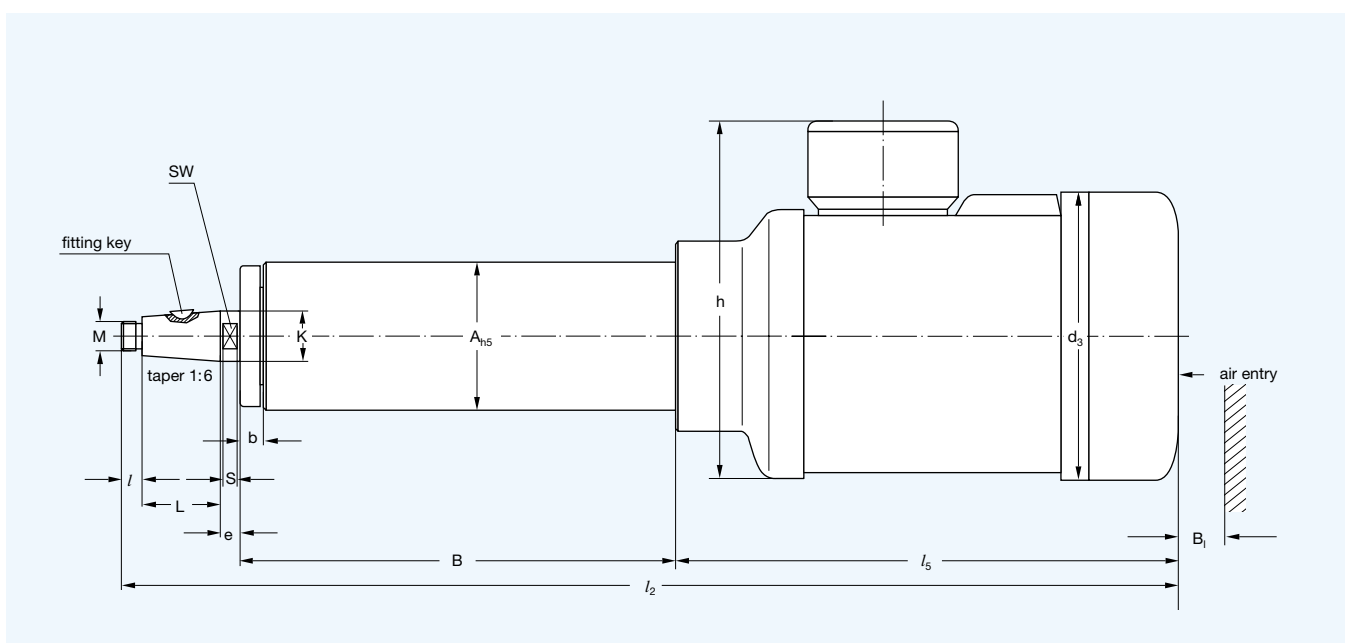
- For-life grease lubrication

Technical data

Nominal voltage: $U = 230/400\text{ V}$

Frequency: $f = 50\text{ Hz}$

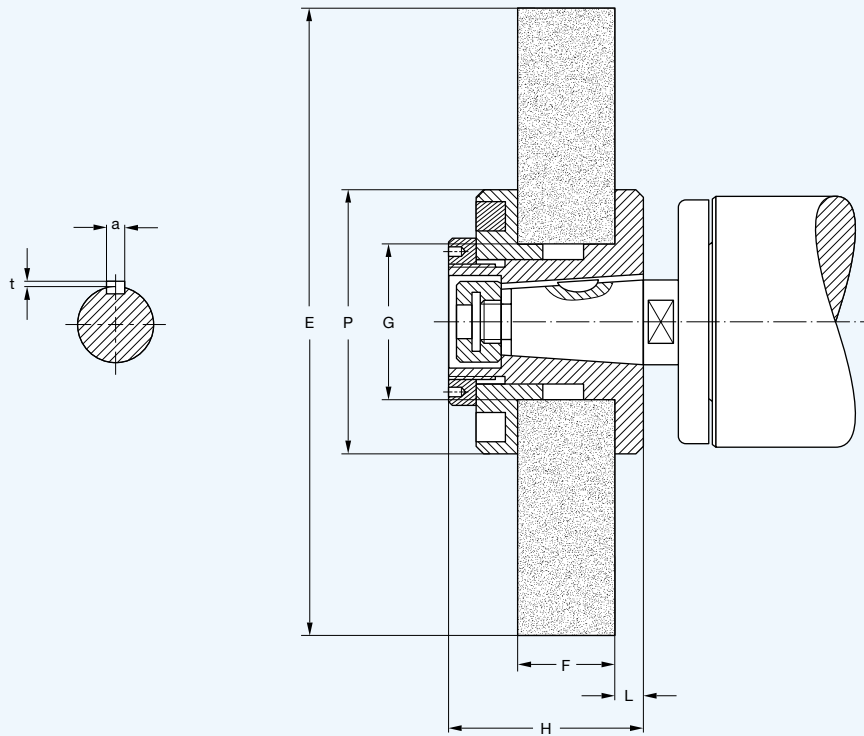
Protection grade IP 54



Motor spindle Type A x B	Dimensions mm													Fitting key DIN 6888	Motor type KPR	max. speed min ⁻¹	Power kW	Current A	Weight kg					
	K	L	e	b	M	l	SW	S	h	d ₃	l ₂	l ₅	B ₁											
MNFA 60x200/21											490													
MNFA 60x315/21	22	34	10	11	M 12x1	10	19	8	180	139	605	240	≥16	4x6,5	71G2	2800	1,1	2,6	16	18				
MNFA 60x400/21											690					6000 ¹⁾			20					
MNFA 80x270/27											635													
MNFA 80x315/27											680													
MNFA 80x400/27	28	42	12	12	M 15x1	11	24	10	200	157	765	300	≥16	5x6,5	80G2	2830	2,2	4,7	33	35				
MNFA 80x500/27											865					6000 ¹⁾			38					
MNFA 80x270/28											635													
MNFA 80x315/28											680													
MNFA 80x400/28	28	42	12	12	M 15x1	11	24	10	200	157	765	300	≥16	5x6,5	80G4	1410	1,5	3,8	33	35				
MNFA 80x500/28											865					3000 ¹⁾			38					
MNFA 100x315/21											725													
MNFA 100x400/21											810													
MNFA 100x500/21	43	63	16	15	M 25x1	13	36	14	216	177	910	320	≥18	6x9	90L2	2850	3,0	6,3	50	54				
MNFA 100x600/21											1010					6000 ¹⁾			60					
MNFA 100x315/22											725													
MNFA 100x400/22											810													
MNFA 100x500/22	43	63	16	15	M 25x1	13	36	14	216	177	910	320	≥18	6x9	90L4	1410	2,2	6,3	50	54				
MNFA 100x600/22											1010					3000 ¹⁾			60					
MNFA 125x400/21											931													
MNFA 125x500/21	58	63	18	16	M 36x1,5	20	50	16	290	216	1031	430	≥35	6x9	112M4	1440	5,5	12,1	100	109				
MNFA 125x400/22											931													
MNFA 125x500/22	58	63	18	16	M 36x1,5	20	50	16	290	216	1031	430	≥35	6x9	112M2	2850	7,5	12,1	100	109				
MNFA 140x400/21											931													
MNFA 140x500/21	58	63	18	16	M 36x1,5	20	50	16	290	216	1031	430	≥35	6x9	112M4	1440	5,5	12,1	110	124				
MNFA 140x400/22											931													
MNFA 140x500/22	58	63	18	16	M 36x1,5	20	50	16	290	216	1031	430	≥35	6x9	112M2	2850	7,5	12,1	110	124				

¹⁾ Maximum permissible speed on working with frequency transformer up to 100 Hz.

Accessories for series MNFA



Type	Designation	Flange					Grinding wheel			Range of applic.		Speed min ⁻¹
		P mm	H	L	a	t	E mm	F mm	G mm	Bore mm	Depth mm	
MNFA 60	SARL 05-51x75	75	48	8	4 ^{H9}	2,3	125 160	25	51	70 - 180	¹⁾	2 800
MNFA 80	SARL 06-51x85	85	55	10	5 ^{H9}	2,3	160 200	32	51	100 - 250	¹⁾	2 830 1 410
MNFA 100	SARL 09-76x122	122	81	12	6 ^{H9}	2,8	200 250	50	76	160 - 300	¹⁾	2 850 1 440
MNFA 125 MNFA 140	SARL 12-127x164	164	88	14	6 ^{H9}	2,8	250 300	50	127	200 - 400	¹⁾	2 850 1 440

¹⁾ Maximum depth of grinding: B + e + L + 2/3 F - chucking length

R

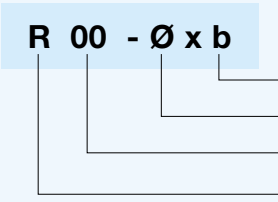
Belt pulleys for grinding spindles

Besides the belt pulleys for the standard accessories for grinding spindles, belt pulleys of other dimensions are also available. The belt pulley diameters are made according to the standardized series R 10 / R 20 so that there is a well assorted variety of belt pulleys available for every application.

Narrower belt pulleys are used for precision spindles as they work at higher speeds and usually with a lower drive power.

R 00 - Ø x b

Designation



b = Width of belt pulley

Ø = Belt pulley diameter

00 = Taper number

Identifying letter:

R = Belt pulley for one direction of rotation

RRL = Belt pulley for clockwise and counter-clockwise rotation

Design

Belt pulleys of good quality are produced and balanced. They can be used alternatively with standard spindles or with precision spindles.

Order example

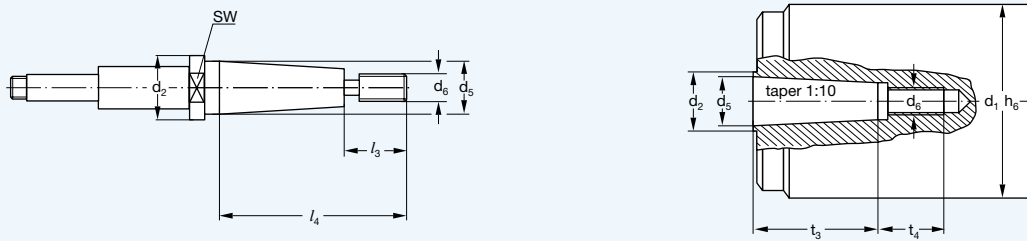
Belt pulley for a grinding spindle with a housing outside diameter of 60 mm, a diameter of 80 mm and a width of 63 mm:

R 04-80 x 63

Designation	Assortment for grinding spindles																			Width b	Spindle units				
	Belt pulley (diameter in mm)																								
	20	25	28	32	40	45	50	(56)	63	(71)	80	(90)	100	(110)	125	(140)	160	180	200	210	230	280			
R 00 - ...	■																							32	SF... 32x...
R 01 - ...		■																						40	SS... 40x...
R 02 - ...			■																					40 50	SF... 40x... SS... 50x... SPV 50x160-13
R 03 - ...				■																				40; 50	SF... 50x... SPV 60x250-15
R 04 - ...					■																			50; 63	SS... 60x... SPV 60x250-18
R 05 - ...						■																		63	SF... 60x... SPV 80x250-23
R 06 - ...							■																	71; 80	SF... 70x... SS... 80x... SPV 80x250-28
R 07 - ...								■																80	SF... 80x... SPV 100x315-33
R 08 - ...									■															90; 100	SS... 100x... SPV 100x315-38
R 09 - ...										■														90	SF... 100x...
R 10 - ...											■													100; 125	SS... 125x... SPV 125x315-48
R 11 - ...												■												100	SFAV 120x...
R 13 - ...													■											100	SFAV 140x...
R 14 - ...														■										120	SFAV 160x...
R 20 - ...															■									130	SFAV 200x...

Series SSI

Abutment dimensions



Abutment dimensions for belt-driven grinding spindles with a female taper and screw-in mandrel

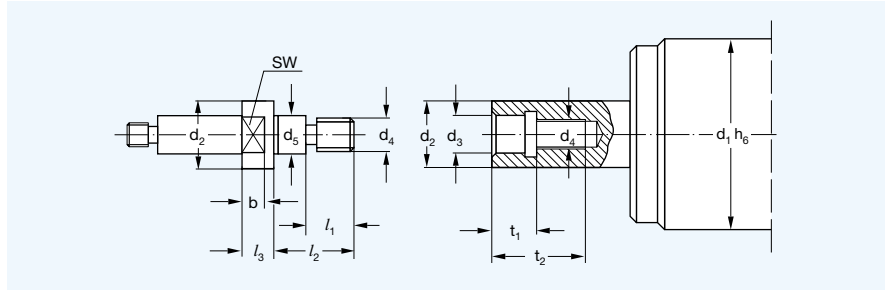
Grinding spindle		Grinding end with screw-in mandrel							
Type	d ₁ mm	d ₂	d ₅	d ₆ ¹⁾	l ₃	l ₄	t ₃	t ₄	SW
SSI 40	40	11	8	M 5	12	32	20	15	9
SSI 50	50	13	10	M 6	14	39	25	17	11
SSI 60	60	18	14	M 8	18	53	35	21	14
SSI 80	80	28	22	M 12	27	82	55	29	24

¹⁾ Clockwise rotation → righthand thread; counter-clockwise rotation → lefthand thread

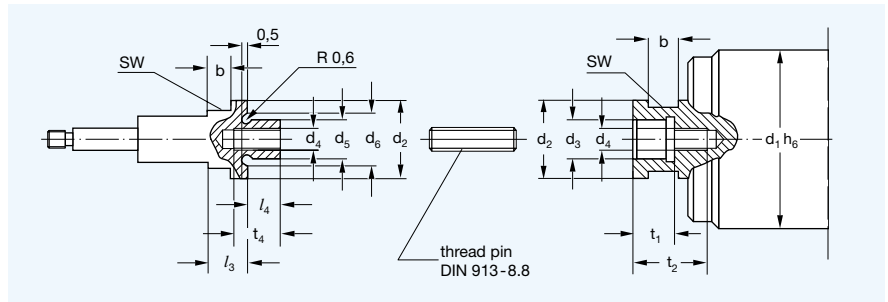
Series SPV / SSV / SSB

Abutment dimensions

SPV 50
 SPV 60
 SSV 60
 SSV 80



SPV 80
 SPV 100
 SPV 125
 SSB 100



Abutment dimensions for belt-driven grinding spindles with a cylindrical hole or extended spindle shaft

Grinding spindle Type	d ₁ mm	Grinding end with screw-in mandrel Dimensions in mm														Thread pin ³⁾
		d ₂	d ₃	d ₄ ¹⁾	d ₅	d ₆	l ₁	l ₂	l ₃	l ₄	t ₁	t ₂	t ₄	b	SW	
SPV 50x160-13/3	50	13,5	7,2 ^{+0,004 0}	M 6	7,2 ^{-0,002 -0,004}	9	11,5	21	8	-	10,5	22	-	6	11	-
SPV 60x250-15/3	60	15,5	8,2 ^{+0,004 0}	M 8	8,2 ^{-0,002 -0,005}	11	13	23	9	-	12	24	-	6	13	-
SPV 60x250-18/3	60	18	10,2 ^{+0,004 0}	M 10x1	10,2 ^{-0,002 -0,005}	13	15	28	10	-	15	29	-	6	14	-
SSV 60	60	18	10 H6	M 8	10 h5	-	15	- ²⁾	-	-	12	30	-	-	-	-
SPV 80x250-23/3	80	23	13,2 ^{+0,004 0}	M 6	13,2 ^{-0,002 -0,005}	17	-	-	9	11	13	26	15	8	19	M 6x30
SPV 80x250-28/3	80	28	16,2 ^{+0,006 0}	M 8	16,2 ^{-0,002 -0,005}	22	-	-	10	14	16	30	19	10	24	M 8x35
SSV 80	80	28	16 H6	M 12	16 h5	22	21	35	5	-	17	40	-	-	-	-
SPV 100x315-33/3	100	33	18,2 ^{+0,006 0}	M 10	18,2 ^{-0,002 -0,005}	25	-	-	12	16	18	34	22	12	27	M 10x40
SPV 100x315-38/3	100	38	22,0 ^{+0,006 0}	M 12	22,0 ^{-0,002 -0,005}	28	-	-	14	18	22	40	28	14	32	M 12x50
SSB 100	100	38	22 H6	M 12	22 h5	28	-	-	14	18	22	40	28	14	32	M 12x50
SPV 125x315-48/3	125	48	26,0 ^{+0,006 0}	M 12	26,0 ^{-0,002 -0,005}	36	-	-	16	22	26	45	28	16	41	M 12x50

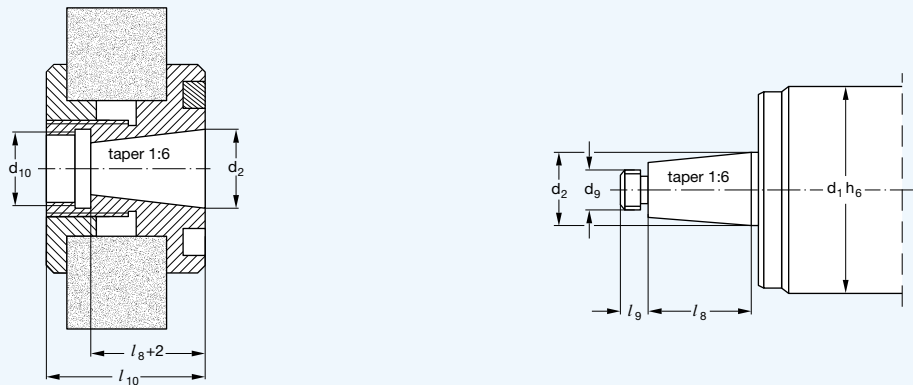
¹⁾ Clockwise rotation → righthand thread;
 counter-clockwise rotation → lefthand thread

²⁾ A fitting bolt is used

³⁾ Minimum quality 8.8 according to DIN 913-8.8

Series SSA / O-SSA / SPV / SPA

Abutment dimensions



Abutment dimensions for belt-driven grinding spindles with male taper and flange

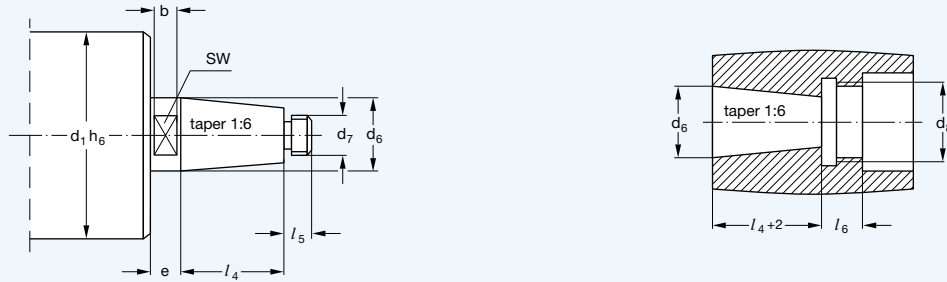
Grinding spindle		Grinding end with flange					
Type	d ₁ mm	d ₂	d ₉ ¹⁾	d ₁₀	l ₈	l ₉	l ₁₀
SSA	32	9	M 6	M 12x1	14	6	25
SSA, O-SSA	40	11	M 6	M 16x1,5	17	6	32
SSA, O-SSA, SSAA 60	50	13	M 8x1	M 18x1,5	20	7	38
SSA, O-SSA, SPA, SSAA 80	60	18	M 10x1 ²⁾	M 20x1,5	28	8	42
SSA, O-SSA, SPA	80	28	M 15x1 ²⁾	M 32x1,5	42	10	60
SSA, O-SSA, SPA, SPAZ 100-605/1	100	38	M 25x1 ²⁾	M 40x1,5	54	12	75
SSA, O-SSA, SPA, SPAZ 100-610/1	125	48	M 30x1 ²⁾	M 50x1,5	63	12	85

¹⁾ Clockwise rotation → righthand thread; counter-clockwise rotation → lefthand thread

²⁾ Clockwise rotation and counter-clockwise rotation (only SSA and O-SSA → righthand thread)

All series

Abutment dimensions



Abutment dimensions; all types										
Grinding spindle		Drive end with belt pulley								
		Dimensions in mm								
Type	d ₁ mm	b	SW	e	d ₆	d ₇ ¹⁾	d ₈	l ₄	l ₅	l ₆
SSA	32	4	8	5	9	M 6	M 12x1	14	6	9
SSI, SSA, O-SSA	40	5	9	7	11	M 6	M 16x1,5	17	6	11
SSI, SSA, O-SSA, SPV 50x160-13/3	50	6	11	7	13	M 8x1	M 18x1,5	20	7	11
SPV 60x250-15/3	60	6	13	7	15,5	M 10x1 ²⁾	M 20x1,5	24	8	12
SSV, SSI, SSA, O-SSA, SSAA, SPA, SPV 60x250-18/3	60	7	14	8	18	M 10x1 ²⁾	M 20x1,5	28	8	13
SPV 80x250-23/3	80	8	19	10	22	M 12x1	M 24x1,5	34	10	16
SSV, SSI, SSA, O-SSA, SSAA, SPA, SPV 80x250-28/3	80	10	24	13	28	M 15x1 ²⁾	M 32x1,5	42	10	16
SPV 100x315-33/3	100	12	27	14	33	M 20x1 ²⁾	M 36x1,5	48	12	16
SSV, SSB, SSA, O-SSA, SPA, SPV 100x315-38/3, SPAZ 100	100	14	32	16	38	M 25x1 ²⁾	M 40x1,5	54	12	16
SSA, O-SSA, SPA, SPV 125x315-48/3	125	16	41	18	48	M 30x1 ²⁾	M 50x1,5	63	12	18

¹⁾ Clockwise rotation → righthand thread; counter-clockwise rotation → lefthand thread

²⁾ Clockwise rotation and counter-clockwise rotation (only SSA and O-SSA → righthand thread)

Safety requirements

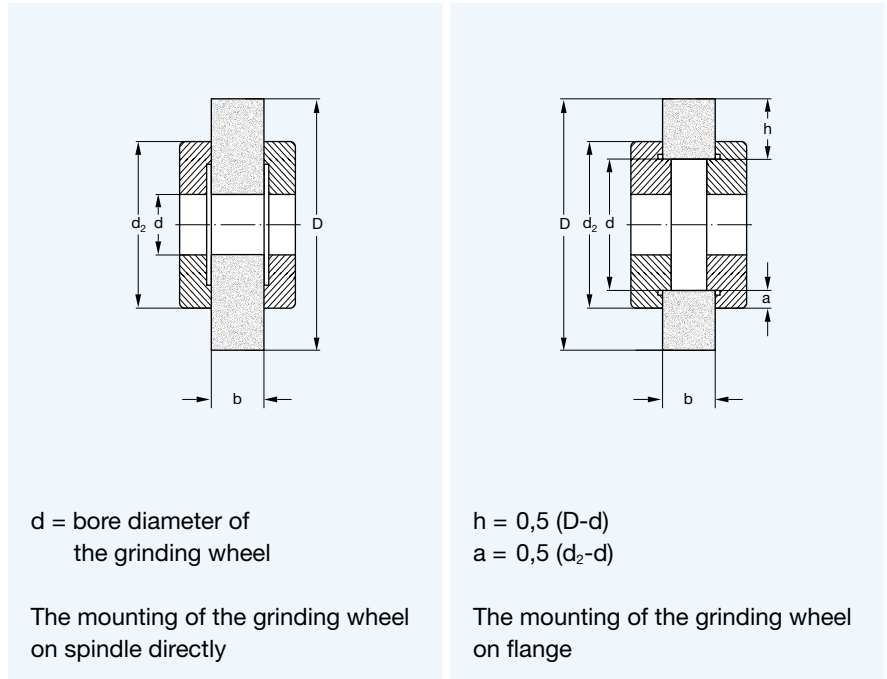
For mounting a spindle and for fastening grinding wheels on flanges or screw-in mandrels, the requirements of the DIN standard must be observed. The safety requirements shown here should only be considered as minimum requirements.

Problems may be caused by screw-in mandrels or grinding wheels. Worn-out parts, especially screw-in mandrels, have to be replaced in time. Out-of-round mandrels have to be replaced in time as well. If you produce mandrels yourself make sure that the replacement mandrels are of the same quality as the original ones. Especially long mandrels possibly require a speed reduction. In such case we recommend consulting the manufacturer.

The safety of the mounted spindle has to be proved in connection with the grinding machine.

The sense of rotation is indicated on the spindles and support flanges by arrows. Spindles for clockwise rotation and counter-clockwise rotation may only be used with flanges and belt pulleys respectively for clockwise rotation and counter-clockwise rotation (RL); this holds especially if both senses of rotation are used.

The spindle speed has to be selected such that the admissible circumferential speed of the grinding wheels is not exceeded even in idle operation.



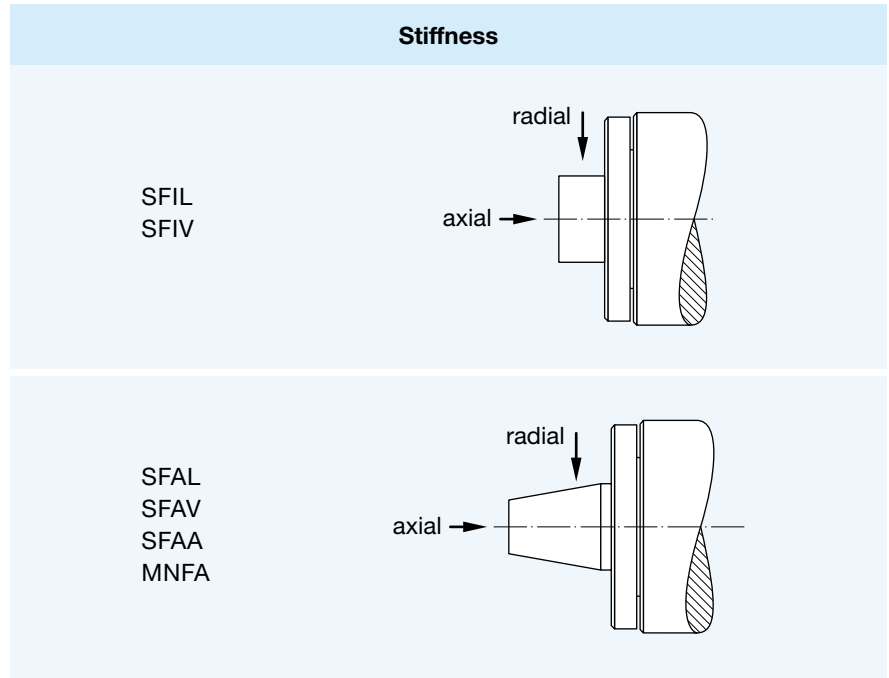
Flanges used for the different machines (excerpt)							
Grinding machine		Grinding wheel				Flange	
Type	Guard	Form	Bond	Outside diameter	Width	Diameter	Interference
				D mm	b mm	d_2 mm	a mm
						$\frac{d_2}{D} \leq 0,2$	$\frac{a}{D} > 0,2$
Stationary grinding machines	without	straight				$\approx \frac{2}{3} D$	
		chamfered on both sides	all	≤ 250		$\approx \frac{1}{2} D$	
	with	all	all	all	all	$\approx \frac{1}{3} D$	$\approx \frac{1}{6} h$

Stiffness

Stiffness of bearings arranged grinding spindles units

The indicated stiffness ratings are guiding values for selection of spindle type most suitable for a specific range of application. The radial ratings of stiffness are mean values and therefore they are valid for all lengths of spindles.

In certain bounds the stiffness of grinding spindle units can be adjusted optimum to particular application by selective measures.



Type	Stiffness N/μm		Type	Stiffness N/μm	
	axial	radial		axial	radial
SFIL 40	30	25	SFAV 40	131	16
SFIL 50	36	30	SFAV 50	138	22
SFIL 60	41	50	SFAV 60	166	43
SFIL 70	52	60	SFAV 70	175	60
SFIL 80	59	70	SFAV 80	193	70
			SFAV 100	234	90
SFIV 60	166	75	SFAV 120	250	120
SFIV 70	175	100	SFAV 140	250	140
SFIV 80	193	125	SFAV 160	290	170
SFIV 100	234	150	SFAV 200	380	220
SFAL 32	22	10	SFAA 60	138	22
SFAL 40	30	16	SFAA 80	166	43
SFAL 50	36	20	SFAA 100	193	70
SFAL 60	41	36	SFAA 120	234	90
SFAL 70	52	46			
SFAL 80	59	50	MNFA 60	131	16
			MNFA 80	175	60
			MNFA 100	234	90
			MNFA 125	250	140
			MNFA 140	250	140

Weight table of grinding spindles

Spindle weight without accessories

Spindle unit	Weight kg	Spindle unit	Weight kg	Spindle unit	Weight kg	Spindle unit	Weight kg
SFIL 40x160	1,4	SFAV 50x160	2,2	SSV 60x350-18x40	7,6	SSA 125x400	36,8
SFIL 40x200	1,7	SFAV 50x200	2,7	SSV 60x350-18x63	7,7	SSA 125x500	45,7
SFIL 40x250	2,1	SFAV 50x250	3,4	SSV 60x350-18x80	7,9	SSA 125x630	57,6
		SFAV 50x315	4,3			SSA 125x800	73,5
SFIL 50x160	2,2			SSV 80x250-28x63	10,3		
SFIL 50x200	2,7	SFAV 60x200	3,8	SSV 80x250-28x80	10,4	O-SSA 40x160	1,4
SFIL 50x250	3,4	SFAV 60x250	4,8	SSV 80x250-28x100	10,5	O-SSA 40x200	1,7
		SFAV 60x315	6,0	SSV 80x250-28x125	10,6	O-SSA 40x250	2,1
SFIL 60x200	3,8	SFAV 60x400	7,6			O-SSA 40x315	2,7
SFIL 60x250	4,8	SFAV 60x500	9,5	SSV 80x315-28x63	12,4		
SFIL 60x315	6,0			SSV 80x315-28x80	12,5	O-SSA 50x160	2,2
		SFAV 70x200	5,5	SSV 80x315-28x100	12,6	O-SSA 50x200	2,7
SFIL 70x200	5,2	SFAV 70x250	6,8	SSV 80x315-28x125	12,7	O-SSA 50x250	3,4
SFIL 70x250	6,5	SFAV 70x315	8,5			O-SSA 50x315	4,3
SFIL 70x315	8,2	SFAV 70x400	10,8	SSI 40x160	1,5		
		SFAV 70x500	13,5	SSI 40x200	1,9	O-SSA 60x250	4,8
SFIL 80x200	6,8			SSI 40x250	2,1	O-SSA 60x315	6,0
SFIL 80x250	8,8	SFAV 80x250	8,8			O-SSA 60x400	7,6
SFIL 80x315	11,2	SFAV 80x315	11,2	SSI 50x160	2,1		
		SFAV 80x400	14,3	SSI 50x200	2,6	O-SSA 80x250	8,8
SFIV 60x200	3,8	SFAV 80x500	17,8	SSI 50x250	3,0	O-SSA 80x315	11,2
SFIV 60x250	4,8	SFAV 80x630	22,7	SSI 50x315	3,3	O-SSA 80x400	14,3
SFIV 60x315	6,0						
SFIV 60x400	7,6	SFAV 100x315	18,9	SSI 60x200	3,5	O-SSA 100x315	18,9
		SFAV 100x400	22,9	SSI 60x250	4,4	O-SSA 100x400	22,9
SFIV 70x250	6,5	SFAV 100x500	28,6	SSI 60x315	5,5	O-SSA 100x500	28,6
SFIV 70x315	8,2	SFAV 100x630	38,8				
		SFAV 100x800	46,0	SSI 80x250	8,7	O-SSA 125x400	36,8
SFIV 80x250	8,8			SSI 80x315	11,0	O-SSA 125x500	45,7
SFIV 80x315	11,2	SFAV 120x400	31,7	SSI 80x400	12,2		
SFIV 80x400	14,0	SFAV 120x500	39,6			SPV 50x160-13	2,15
		SFAV 120x630	49,9	SSB 100x315	18,5		
SFIV 100x315	18,9	SFAV 120x800	63,3	SSB 100x400	22,5	SPV 60x250-15	4,5
SFIV 100x400	22,9			SSB 100x500	28,4	SPV 60x250-18	4,7
SFIV 100x500	28,6	SFAV 140x400	39,9				
		SFAV 140x500	53,9	SSA 32x125	0,6	SPV 80x250-23	8,5
		SFAV 140x630	67,9	SSA 32x160	0,8	SPV 80x250-28	9,0
SFAL 32x125	0,6			SSA 32x200	0,96		
SFAL 32x160	0,8	SFAV 160x400	56,3			SPV 100x315-33	18,0
SFAL 32x200	1,0	SFAV 160x500	70,4	SSA 40x160	1,4	SPV 100x315-38	19,5
		SFAV 160x630	88,7	SSA 40x200	1,7		
SFAL 40x160	1,4			SSA 40x250	2,1	SPV 125x315-48	29,5
SFAL 40x200	1,7	SFAV 200x500	110,0	SSA 40x315	2,7		
SFAL 40x250	2,1	SFAV 200x630	138,5			SPA 100x400	23,3
				SSA 50x160	2,2	SPA 125x400	34,6
SFAL 50x160	2,2			SSA 50x200	2,7		
SFAL 50x200	2,7	SFAA 60x250-50x160	7,4	SSA 50x250	3,4	SPAZ 100-259	18,6
SFAL 50x250	3,4	SFAA 60x250-50x200	7,9	SSA 50x315	4,3		
		SFAA 60x250-50x250	8,6			IAO/1	1,1
SFAL 60x200	3,8	SFAA 60x250-50x315	9,5	SSA 60x200	3,8		
SFAL 60x250	4,8			SSA 60x250	4,8	SSST 125/1	4,1
SFAL 60x315	6,0	SFAA 80x250-60x200	12,9	SSA 60x315	6,0	SSST 200/2	5,3
		SFAA 80x250-60x250	14,6	SSA 60x400	7,6		
SFAL 70x200	5,2	SFAA 80x250-60x315	16,6	SSA 60x500	9,5	SSAA 60x250-50x160	7,4
SFAL 70x250	6,5	SFAA 80x250-60x400	17,3			SSAA 60x250-50x200	7,9
SFAL 70x315	8,2			SSA 80x250	8,8	SSAA 60x250-50x250	8,6
		SFAA 100x315-80x315	28,6	SSA 80x315	11,2	SSAA 60x250-50x315	9,5
SFAL 80x200	7,0	SFAA 100x315-80x400	31,6	SSA 80x400	14,3		
SFAL 80x250	8,8	SFAA 100x315-80x500	35,3	SSA 80x500	17,8	SSAA 80x250-60x250	14,2
SFAL 80x315	11,2			SSA 80x630	22,7	SSAA 80x250-60x315	16,6
		SFAA 120x500-100x300	56,3			SSAA 80x250-60x400	17,3
SFAV 40x160	1,5			SSA 100x315	18,9		
SFAV 40x200	1,8	SSV 60x250-18x40	5,8	SSA 100x400	22,9	SSAA 80x315-60x200	15,5
SFAV 40x250	2,2	SSV 60x250-18x63	5,9	SSA 100x500	28,6	SSAA 80x315-60x250	16,5
SFAV 40x315	2,8	SSV 60x250-18x80	6,0	SSA 100x630	38,8	SSAA 80x315-60x315	17,8
				SSA 100x800	46,0	SSAA 80x315-60x400	19,5

Circumferential speeds

Grinding spindle speed (n) min ⁻¹	Grinding wheel O.D. (d) mm																					
	3	4	5	6	8	10	13	16	20	25	32	40	50	63	80	100	125	160	200	250	315	
	Circumferential speed v (m/s)																					
120 000	18,9	25,1	31,4	37,7	50,3	62,8																
96 000	15,1	20,1	25,1	30,2	40,2	50,3	65,4															
72 000	11,3	15,1	18,9	22,6	30,2	37,7	49,0	60,3														
60 000		12,6	15,7	18,9	25,1	31,4	40,8	50,3	62,8													
48 000			12,6	15,1	20,1	25,1	32,7	40,2	50,3	62,8	80,4											
43 000				13,5	18,0	22,5	29,3	36,1	45,1	56,3	72,1											
40 000					16,8	21,0	27,2	33,5	41,9	52,4	67,0	83,8										
36 000					15,1	18,9	24,5	30,3	37,7	47,1	60,3	75,4										
33 000					13,8	17,3	22,5	27,7	34,6	43,2	55,3	69,2										
32 000					13,4	16,8	21,8	26,8	33,5	41,9	53,6	67,0	83,8									
30 000						15,7	20,4	25,1	31,4	39,3	50,3	62,8	78,6									
29 000						15,2	19,7	24,3	30,4	38,0	48,6	60,7	75,9									
27 000						14,1	18,4	22,6	28,3	35,4	45,3	56,5	70,7									
25 000						13,1	17,0	20,9	26,2	32,7	41,9	52,4	65,5									
24 000							16,3	20,1	25,1	31,4	40,2	50,2	62,8	79,1								
22 500							15,3	18,8	23,6	29,5	37,7	47,1	58,9	74,2								
21 000							14,3	17,6	22,0	27,5	35,2	44,0	55,0	69,2								
20 000								16,8	20,9	26,2	33,5	41,9	52,4	66,0	83,8							
19 000								15,9	19,9	24,9	31,9	39,8	49,8	62,7	79,6							
18 000								15,1	18,9	23,6	30,2	37,7	47,1	59,4	75,5							
16 000								16,8	21,0	26,8	33,5	41,9	52,8	67,1	83,8							
15 000								15,7	19,6	25,1	31,4	39,3	49,5	62,8	78,6							
14 000								14,7	18,3	23,5	29,3	36,7	46,2	58,6	73,3							
13 500								14,1	17,7	22,6	28,3	35,4	44,6	56,6	70,7							
13 000								13,6	17,0	21,9	27,2	34,0	42,9	54,5	68,1							
12 500									16,4	20,9	26,2	32,7	41,2	52,4	65,5	81,8						
12 000									15,7	20,1	25,1	31,4	39,6	50,3	62,9	78,6						
11 500									15,1	19,3	24,1	30,1	38,0	48,2	60,2	75,3						
11 000										18,4	23,0	28,8	36,3	46,1	57,6	72,0	92,2					
10 500										17,6	22,0	27,5	34,6	44,0	55,0	68,7	88,0					
10 000										16,7	20,9	26,2	33,0	41,9	52,4	65,5	83,8					
9 000												18,9	23,6	29,7	37,7	47,1	58,9	75,4	94,3			
8 000												16,8	20,9	26,4	33,5	41,9	52,4	67,0	83,8			
7 500												15,7	19,6	24,7	31,4	39,3	49,1	62,8	78,5			
7 000													18,3	23,1	29,3	36,7	45,8	58,6	73,7	91,6		
6 000													15,7	19,8	25,1	31,4	39,3	50,3	62,8	78,6		
5 500													14,4	18,1	23,0	28,8	36,0	46,4	57,6	72,0		
5 000														16,8	21,3	26,6	33,2	42,5	53,2	66,5	83,8	
4 000														13,2	16,8	20,9	26,2	33,5	41,9	52,4	66,0	
2 850															9,4	11,9	14,9	16,7	23,9	29,8	37,3	47,0
1 440																6,03	7,54	9,42	12,1	15,1	18,9	23,8

High-speed grinding wheels required

Standard grinding wheels (up to 35 m/s)

$$v = 5,24 \cdot 10^{-5} \cdot d \cdot n \quad v \text{ (m/s)} \quad d \text{ (mm)} \quad n \text{ (min}^{-1}\text{)}$$

Notices

Production programme and position

- Belt-driven grinding spindles of all types, with accessories
- Motor grinding spindles with flanged-on motor (standard frequency)
- Motor grinding spindles with integrated motor (medium frequency)
- Special grinding spindles for many applications e.g. grinding of decoration glass, wood working

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